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Belfast Natural History and Philosophical Society.

SESSION 1936-1937.

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PROCEEDINGS and REPORTS

of the

Belfast Natural History and Philosophical Society

Second Series: Vol. I. Part II.
SESSION 1936-1937.

EDITED BY ARTHUR DEANE, F.R.S.E., M.R.I.A.,
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1938

BRITISH MUSEUM NATURAL HISTORY

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[Established 1821.]

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[Please write name in full.]

Description .....

Residence .....

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....., being desirous of becoming a Member of the Society, I, the undersigned member, recommend.....as a suitable candidate for election.

Dated this.....day of....., 19.....

Signature of Member .....

[Candidates must be known to the Member signing this form.]

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6th April, 1937.

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PROFESSOR R. RUGGLES GATES, M.A., D.Sc., LL.D., F.R.S.

"EVENING PRIMROSES AND EVOLUTION."

Illustrated by Slides.

The modern study of evolution has many aspects, but it might appear that evening primroses were peculiar organisms on which to found theories and experiments in evolution. These plants, belonging to the genus Oenothera, are native to North America, but during the last three centuries they have been introduced widely into Europe and have become naturalized in many places, usually preferring sandy areas with disturbed soil, such as railway embankments, roadsides and sea shores. Parkinson (1629) first called them the tree primrose of Virginia in the seventeenth century, and they have since come to be known as evening primroses from their yellow flowers which open in the evening, although they are in no way related to our primroses. Their importance in evolutionary study is derived from the fact that a certain species of evening primrose, *Oenothera Lamarckiana*, was first used for experiments in evolution.

It was the observation of variation, inheritance, geographical distribution, geological succession and embryological development in organisms which convinced Darwin, and through him the world, of the fact of organic evolution. But the subject remained an observational science until the end of the nineteenth century. De Vries in Amsterdam discovered variations in evening primroses growing in an abandoned potato field in 1886, took them into his garden, began pedigree cultures with them and so inaugurated the method of experimental evolution. Darwin created the theory of natural selection to explain the common occurrence of adaptations in organisms, and also to account for descent with modification, or divergence of the descendants from a common ancestor.

Since Darwin's time, the method of experimental evolution which de Vries inaugurated has led to great advances in our knowledge and many fundamental alterations in our points of view. These changes in view point have regard to both the *modus operandi* of species transformation and the actual pathways which phylogenies have taken; for obviously, considering the incompleteness of our knowledge of the past, our conception of the methods of evolution can never be separated entirely from our understanding of the course of evolution considered as a historical sequence of types. The other great contribution of de Vries to evolution was his mutation theory, which involves thinking, like the physicists and chemists, in terms of definite units which are discontinuous. In the nineteenth century, evolutionary thinking was in terms of continuity, but since

1900 the more analytical type of thinking involved in evolutionary discontinuity has held increasing sway. Mendelism, rediscovered in that year by de Vries and two other botanists, shows in its modern development that inheritance takes place by the transmission of definite genes or determiners, whose location we now recognize is in the chromosomes.

The mutation theory accounts for the origin of these differences, and shows that variation is itself a process of discontinuity. Having made the fundamental step of determining our units of variation and heredity, and observing them experimentally, we can now investigate the various ways in which new species arise by the origin of new units and various forms of duplication and re-shuffling of the old. In connection with this work the evening primroses have had a longer history than any other plants or animals. In *Oenothera Lamarckiana* de Vries described in 1901 a series of new forms which he called mutations, differing in various characters of leaf and flower from the parent type and perpetuating those characters in later generations (de Vries, 1909).

Later work, in which I took part, beginning in 1907, was devoted to an analysis of these various mutations. This phase ended about 1915 (see Gates, 1915) by showing that some of them had an extra chromosome (15), another had doubled the whole chromosome series to give 28, another had three full sets of chromosomes (21); still others, such as *brevistylis* and *rubricalyx*, were gene mutations inherited as single Mendelian differences, while *rubrinervis* came in a different category. Its origin has more recently been explained through interchange of segments between two non-homologous chromosomes, without any change in number. The conceptions arising from these discoveries have of course been widely applied, and similar types of mutations have been found and investigated in many other plants and animals.

The segmental interchange as well as the changes in chromosome number mostly take place during the critical period of meiosis or formation of the reproductive cells. At this time the chromosomes in all organisms are normally reduced to one half in number. This reduction is an intricate process, during one stage of which the chromosomes, in the form of long and coiled, extremely delicate threads, come to pair with each other throughout their length. This pairing is due to some specific attraction, not merely between the homologous chromosomes as a whole, but between corresponding portions each to each. This is followed after condensation, by separation of the members of each pair, so that they enter separate nuclei. In many cases the chromosomes do not separate as wholes, however, but while in the intertwined thread stage the threads may break and rejoin in a new way—a process known as crossing-over. This means new linkage relationships of the genes contained in these chromosomes.

Now in organisms generally the different pairs of chromosomes are quite free from each other and behave independently, thus giving ordinary Mendelian inheritance, but in most of the evening primroses they are linked up in a ring during the critical stages of pairing and reduction in number. This has a fundamental effect on the genetics of these plants. About 15 years ago it was discovered that different species of evening primrose have different numbers of chromosomes in the ring, although all the species have the same total number, 14. Thus *Oenothera Lamarckiana* has a ring of 12 chromosomes and one free pair. Its derivative *rubrinervis* has a ring of six and four free pairs. *O. rubrinervis* in turn gives rise to a form *deserens* with the seven pairs all free. Most of the wild species in North America have been found to have all their chromosomes linked up into a ring of 14. This we call complete catenation.

There is evidence that all the chromosomes occupy fixed positions in the ring, and that each chromosome in the ring consists of two ends and a central portion, the central portions of all 14 chromosomes being different while the two ends of each chromosome correspond respectively with one end of two other chromosomes (see Catcheside 1936, Ford 1936). Since similar portions of the chromosomes pair, each chromosome will have one arm or end attached to one chromosome and the other arm attached to a different one, like a group of children playing ring o' roses. In this way the ring is formed, its 14 chromosomes all being unlike except at the pairing ends.

The ring so formed is ultimately broken by separation of the chromosomes, alternate ones moving to opposite nuclei. Before this occurs the chromosomes forming the ring arrange themselves in a zigzag. It may easily be shown that the ultimate result of this arrangement will be the formation always of the same two kinds of gametes or chromosome combinations; which is quite different from the result in other organisms where free assortment of the various pairs takes place because they are unattached. Most of the species of Oenothera therefore produce two kinds of pollen grains and two kinds of egg cells, although frequently only one kind of pollen or egg is viable. Like kinds of gametes also usually produce a non-viable zygote, and so such plants as *O. Lamarckiana* breed true although essentially hybrid in nature, and half their seeds are empty because the combination of like gametes produces an embryo which fails to develop. Another peculiarity of such species is that when crossed with another form they frequently produce two hybrid types (twin hybrids) in the first generation. The analysis of this type of species by cross-breeding to homozygous or pure types is known as gamolysis (see Gates and Catcheside, 1932).

As regards the origin of the linked condition of the chromosomes, there is evidence that it has arisen within the genus Oenothera and it can arise in two ways: (1) by crossing between different species or types in which one or more pairs of chromosomes are non-homologous, (2) by crossing-over or exchange of ends between non-homologous chromosomes in a species. Such chromosome rings can also be produced by X-raying the pollen in a homozygous form such as *O. blandina*, which has seven free pairs of chromosomes (Catcheside, 1935). As a result of the segmental interchange so produced, some of the offspring will have a ring or four or even six chromosomes, and this catenation will persist in later generations.

I have concluded elsewhere (Gates, 1933) from various lines of evidence, that the original evening primroses were species with large flowers occupying the more southerly latitudes in North America, i.e., Mexico and perhaps the Southern States. The genus appears to have evolved mainly since the Ice Age, moving northwards with other vegetation as the ice retreated and giving rise to a series of mutations producing smaller and smaller flowers, so that now the Canadian species in the highest latitudes have in general the smallest flowers.

Contemporaneous with this decrease in flower-size went an increase in the catenation of the chromosomes, the Canadian species now, so far as known, all having a ring of 14 chromosomes. While these two evolutionary processes were taking place, the gene mutations so characteristic of other organisms must also have been occurring on a large scale, thus producing further material for the differentiation into the 85 species now known. This, in brief outline, is the evolution of the genus as it is believed to have taken place on the North American continent (see Gates, 1936a). Its recent rapid evolution since the Pleistocene accounts for the present remarkable polymorphism of the genus. It is particularly

striking that in areas such as Nova Scotia, which were heavily glaciated and must have lost their entire flora, there is now a striking diversity of endemic species and varieties of Oenothera, although practically no other endemic species occur there. This can only be interpreted as rapid post-Pleistocene evolution within the genus.

These plants are for the most part self-pollinated, but hybrids which may occasionally occur between distinct species will produce new forms which again breed true owing to the catenation or linkage of their chromosomes. Further analysis of the genetics of these Oenothera species with linked chromosomes shows that they are in effect hybrids, because the middle portions of all the chromosomes are different, yet they breed true for reasons which are easily understood. While other polymorphic genera such as Taraxacum or Hieracium have specialized in various forms of apogamy, Oenothera has specialized in catenation, and this accounts for its rapid evolution and present multiformity.

One other conception which has arisen from the Oenothera work and has now become of great significance is that of parallel mutations (see Gates, 1936b). The first cases were described in Oenothera in 1912. Since that time many other cases have been described in other species of Oenothera and in many other organisms. From the fact that the same mutation can arise independently in different species we must infer that if two species possess in common a certain character they have not necessarily derived that character from a common ancestor. This principle of parallel variations therefore introduces a complication into the interpretation of all phylogenies, because in some cases a given character will have been derived from a common ancestor, while in others it will have arisen independently in more or less distantly related species.

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24th November, 1936.

Professor G. Waterhouse, M.A., Litt.D, M.R.I.A.

" GOETHE, GIESECKE AND IRELAND."

[No Abstract.]

8th December, 1936.

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" ART AND THE CHILD."

[No Abstract.]

12th January, 1937.

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" TRIAL BY JURY."

[No Abstract.]

9th February, 1937.

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" PRIMITIVE RELIGION IN ANCIENT ITALY."

[No Abstract.]

23rd February, 1937.

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[Mrs. D. L. R. Lorimer.]

" PEASANT LIFE IN HUNZA IN THE KARAKORUM."

[No Abstract.]

9th March, 1937.

" DON GYPSY."

Dr. Walter Starkie, F.T.C.D., M.R.I.A.

[No Abstract.]

ARCHAEOLOGICAL SECTION.

CORICK ABBEY, TYRONE.

By O. Davies.

The small abbey-church of Corick lies on a cliff above the R. Glenelly about 200 yards from its junction with the R. Owenkillew.(1) The spot is well known locally for its beautiful scenery. The church itself is situated within a small graveyard, and to the north of it are the remains of walls, believed to have belonged to monastic buildings. Without excavation, however, it is impossible to make out their plan or purpose.

Like the abbeys of Pubble and Scarvagherin in the same district,(2) Corick was founded in the latter part of the fifteenth century for the third order of Franciscan Friars. It owned four townlands, which were confiscated in 1609.(3) Tradition adds that there used to be a castle at Corick, where James O'Donnell was imprisoned by Shane O'Neill. If this is true, it was probably no more than a small block-house, and its association with the abbey cannot be proved.

Some years ago the Archaeological Section entrusted the writer with the task of restoring the east window of the church, of which a number of stones were believed to be lying in the graveyard. Permission was given by the Strabane R.D.C. and by the Ministry of Finance, which also made a financial grant towards the work. The restoration was carried out according to the advice of Mr. Rippingham, architect to the Ministry. Mr. William Hempton was employed as mason. Thanks are also due to Mr. Ross Henderson for many kindnesses in making local arrangements.

It was found that many of the scattered stones belonged to other windows, and that it would not be possible to complete the outer arch of the east window; all the inside stones save one were found, but it was not felt advisable to cut an extra stone and rebuild completely the inner arch, as if left unsupported it would be dangerous in a storm. However, the ugly walling which closed the window has been removed, and the central mullion is now supported by three rustless steel bars. One of the round-headed arches was able to be replaced, and also a portion of the other. At the same time, the ivy which was covering the east wall has been removed and the wall itself repointed, so that with a small amount of supervision the ruin will survive many centuries yet.

At the same time the opportunity was taken to make a detailed study of the architecture of the church. This involved the clearing of the inner face of the south wall, but otherwise there was no need for excavation. Many cut stones were found in use as gravestones, despite their unsuitably. These were not disturbed, unless they belonged to the east window, when other stones were substituted for them. On the plan is shewn the position of each stone as found; the only conclusion that emerges therefrom is that stones have been removed to all parts of the graveyard, and that their present site is no indication of the part of the church whence they are derived.

---

(1) O.S. sheet 18 plan 1 trace 5.
(2) O.S. sheet 17 plan 7 trace 5 ; sheet 16 plan 11 trace 6.
(3) *Inquisitionum Cancellariae hibernicae Repertorium* II, inquisition at Dungannon 23/8/1609.

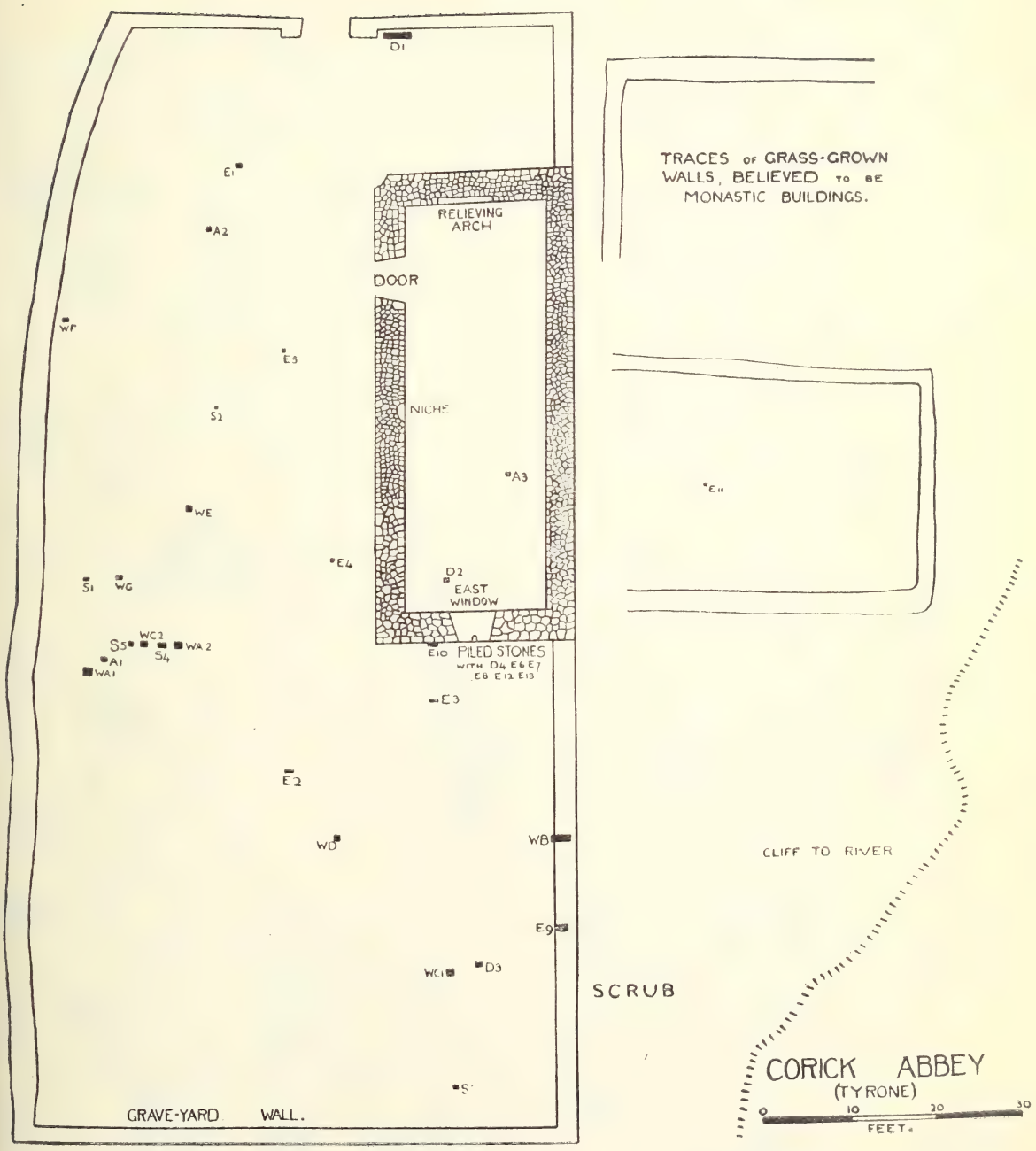
D1
E1
A2
RELIEVING ARCH
DOOR
WF
E3
S2
NICHE
A3
WE
E4
D2
EAST WINDOW
S1
WG
WC2
S5
WA2
S4
A1
WA1
E10 PILED STONES WITH D4 E6 E7 E8 E12 E13
E3
E2
WD
WB
E9
WC1
D3
S3
GRAVE-YARD WALL.
SCRUB
TRACES OF GRASS-GROWN WALLS, BELIEVED TO BE MONASTIC BUILDINGS.
E11
CLIFF TO RIVER
CORICK ABBEY
(TYRONE)
0 10 20 30
FEET.

FIG. 1.

The church is a rectangular building, of internal dimensions 47½ x 16½ ft.; the walls average 3½ ft. in thickness. The east wall is built of large blocks of fine local grit, split approximately rectangularly, with small stones in the interstices. The corner-stones are squared; most of those on the south-east have disappeared, but on the north-east they survive to a height of nearly six feet. The upper courses on the south of the window seem to have been rebuilt in recent times to prevent dilapidation; it is impossible to trace accurately the line of the original structure.

The south wall stands to an average height of two feet above the internal ground-level, which is about 2 ft. 3 in. higher than the original floor-level, having been raised by fallen masonry and by burials within the church. The inner face of the wall has in places fallen, while towards the east end the whole wall has disappeared and has been replaced by loosely piled stones. About half-way along is an apsed niche with floor of stones. It may represent merely the site of an unusually large fallen stone, or it may have been to hold the stoup described below.

Of the north wall the east end survives to a height of ten feet, giving a minimum height for the eaves. How much of the rest of the wall is original it is difficult to say, owing to the dense growth of briars and ivy covering it. I suspect that it was largely ruined at an early date and rebuilt to enclose the graveyard.

The west wall survives in a fragmentary condition to a height of over fifteen feet. There is sufficient of it to shew that it contained no windows. On the inner face is a relieving arch 6 ft. 8 in. wide and 8 in. high, with wedge-shaped keystone, whose base is 1½ ft. above the present internal ground-level. The stones of the arch are not cut, and there is no sign of it on the outer wall-face, so its purpose must have been structural.

The door was near the west end of the south wall. The edges of the rough wall-stones may be traced on either side, though the cut-stone jambs are missing. The present width outside is 4 ft. 2 in., inside 5 ft. 5 in., the opening in the outer face of the wall being set three inches eccentrically to that in the inner. The stones presumed to form the outer and inner faces of the arch are, however, of the same size, so the original door presumably did not splay inwards. The outer arch is represented probably by D1, which is unglazed and roughly hammer-dressed, the inner by D3 and D4, whose moulding is simpler. The latter would have formed a round arch 3 ft. 7 in. across and 1 ft. 5½ in. high. The arch may not have been quite semicircular, or a smaller piece may be missing. The combined width of D1 and D3 is 2 ft. 2 in., which is six inches less than the thickness of the wall. Either the door may have been set back slightly, or there was rubble-filling between the outer and inner facing-stones. The jambs of the door have disappeared save probably for D2. This stone is seven inches high, and its depth would enable it to be tied back into the wall. On the upper surface is a groove for a clamp, like those supporting the springing arches in the east window. This suggests that D2 was the topmost stone of one jamb. There is no indication of the height of the door, so it could not be restored.

The mullions of the east window were complete before restoration, and we reset only the stones of the arch. Stones marked E come from this window. They are rather roughly hammer-dressed. The window was walled up in recent times. It was glazed on the outer face, and at vertical intervals of eleven inches are dowel-holes for cross-bars.

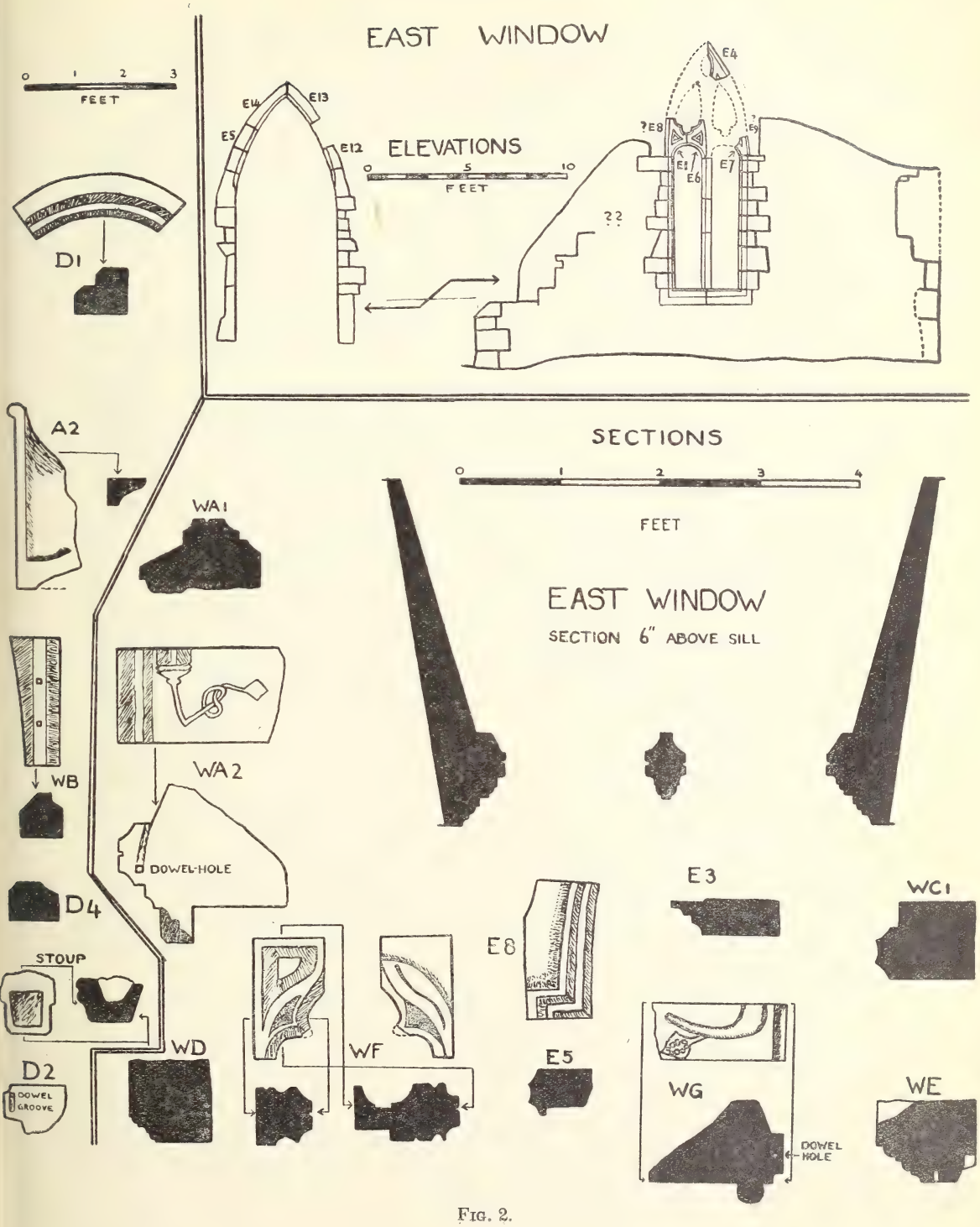
EAST WINDOW
0 1 2 3
FEET
E4
E13
E5
E12
ELEVATIONS
0 5 10
FEET
?E8
E9
E1
E6
E7
??
E4
D1
A2
SECTIONS
0 1 2 3 4
FEET
EAST WINDOW
SECTION 6" ABOVE SILL
WA1
WB
WA2
DOWEL-HOLE
D4
STOUP
D2
DOWEL GROOVE
WD
WF
E8
E5
E3
WC1
WG
DOWEL HOLE
WE

Fig. 2.

The outer face has two round-headed lights with a complex moulded frame on sill and mullions. The upper part of the frame was pointed, with three small lights set therein, whose form can be roughly restored; the lower ones were cusped. The style is typical of Irish work in the late fifteenth and sixteenth centuries; many examples survive, often built into more modern churches.

A window of this type should have a drip-moulding, of which a series of stones probably survive. E8 and E9 would be the base of this moulding, resting on carved terminals which have disappeared. These stones are 1 ft. 1 in. thick and rough on the inside. To the upper part of the arch may be attributed E2, E3 (1 ft. 6 in. high), E10 and E11 (7 in. high). E11 is slightly curved, though it is less easy to be certain of a curve on E2. E8 and E9 have been provisionally restored in their approximate positions.

The inner face of the east window survives but for one stone, E5, E12, E13 and E14 having been found in the graveyard. There is a narrow diagonal moulding on the pointed arch, but none on the mullions. The sill seems to have disappeared, as where it should be were found loose stones and fragments of mortar.

In the graveyard there were stones from several other windows. Where these stood we cannot say, as the side-walls are nowhere preserved to a sufficient height. There are gaps in both towards the east end, where windows might have been. Some of the cut stones suggest windows of considerable dimensions, such as one would hardly expect in the side-walls of a small country-church. We have seen that the eaves must have been at least ten feet above the ground, but a drip-moulding like WA2 might be expected to belong to a window more than eight feet high, and its sill is not likely to have been less than five feet from the ground. Thus the height of the eaves was probably at least fifteen feet.

From WA we have a piece of the mullion (WA1) 3 ft. 2 in. high, with sockets for cross-bars at ten-inch intervals, and the right-hand terminal of the drip-moulding (WA2), 11 in. high, with a dowel-hole to take the springing arch. The terminal consists of a small bracket 4½ in. wide, resting on an interlaced cord-moulding ½ in. wide and of rather square section, which ends in a diamond. The backs of the WA stones were left rough, and cut to bond into the rubble walling. The window was glazed. The first cross-bar was nine inches below the spring of the arch. The cut-stone frame was on the outer surface of the wall, and the opening splayed backwards at an angle of about 30 degrees.

Whether the inner face of this window had a cut-stone frame like that of the east window is uncertain. I found several squared unmoulded stones shaped for a splaying aperture, which would have suited well in this position. The stones WC1 and WC2 might also have been on the inner face of a window, though they do not seem suited to a splaying aperture. The former is 2 ft. high, the latter 1 ft. 1 in.. On neither is there any curve, though from the analogy of the east window one would expect them to be derived from an arch rather than from a mullion.

WB is a roughly hammer-dressed piece of mullion with two bar-sockets 11 in. apart. Its sides are not parallel, apparently because it bonded back into a wall, as there is no evidence that it formed part of an arch. It must have come from an unglazed window, perhaps in the monastic buildings.

WD is a straight piece of mullion, unglazed. It cannot be part of a drip-moulding, as these did not extend down the jambs; nor is there any sign that it is derived from a grave-monument. Its height is unobtainable, as it is deeply bedded. The section suggests the outer part of a window-frame like that of the east window.

WE is part of an elaborately moulded jamb with deep socket for bolt or bar. On the inside, a small square is cut out of the top of the moulding. The base at the back projects, to tie into the wall. The section suggests that this stone is derived from a window rather than from a door.

WF is the top corner of a small trefoil glazed window with rectangular frame. It is moulded on both faces, so if it stood in the church, the aperture for it must have left free the whole side of the frame. Such windows, though more suited to domestic architecture, are sometimes found in fifteenth-century Irish churches, such as Drumlane.(4)

WG is a simply carved terminal with horn-shaped corbel of squarish section, whence projects a stalk and leaf with four depressions along each side of the midrib. On the upper surface of the stone is a dowel-hole to take a springing arch. The stone is probably derived from an unglazed window of simple section rather than from a door.

There were found three examples of the A2 type. They are roughly hammer-dressed. The back and one side are flat save for the volute, the front face is moulded to effect a transition to the side of the volute. These stones were perhaps gable-ends to hold the ridge-pole, one on each side, so that the projecting volutes would have almost touched. If they have been set horizontally at the eaves to tie down the thatch, one would expect equality of treatment of each face. A fragment of one has recently been found at the sixteenth-century castle of Island MacHugh.

On the plan are marked several S-stones. These seem to be fragments of seventeenth or eighteenth-century gravestones, which though quaint and interesting are of no importance for the architectural study of the church.

Rev. J. M'Fadden kindly allowed me to publish what was probably a holy-water stoup found in a field just below the abbey, and now in the garden of Badoney Manse. The front and part of the sides are dressed with bevelled corners, save that the top is rather broken. The back and base are rough, suggesting that they were built into a wall. The stone contains a shallow basin without drain.

Rev. A. Whyte of Gortin used to possess what is believed to be the font from Corick Abbey. It has now passed to Mr. Myles of Newtownstewart, who kindly allows me to publish it. It is a circular granite block, $7\frac{1}{4}$ in. in diameter, with four bosses on the rim, fading into the spherical surface at $2\frac{1}{2}$ in. depth. The base is broken, where the stone may have rested on a support. The rim is somewhat damaged. Within the stone is a well-smoothed basin $4\frac{1}{2}$ in. across and 3 in. deep. The stone might have had a secular purpose, e.g., for pounding corn; but though it has no drain, its use as a font is not excluded.

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(4) Cavan, O.S. sheet 14 plan 12 trace 6.

EXCAVATIONS AT CLONTYGORA LARGE CAIRN, CO. ARMAGH.

By O. Davies and T. G. F. Paterson.

The grantitic plateau south-east of Newry contains a number of megalithic monuments, especially round the slopes of the ring-dyke and on Slieve Gullion itself. The central plain, consisting of older granite, may have been swampy or densely forested in prehistoric times, while the peaks of the ring-dyke were probably too boulder-strewn to attract even a pastoral people. Early settlers were further tempted to build their tombs in this district by the supply of massive granite boulders, serviceable if once split, of which a considerable number were employed at the monument which we excavated. The use of ice-borne instead of quarried stones has been observed elsewhere. especially at Clady Halliday, and their rounded forms were probably pleasing.

But S. Armagh interests the prehistorian also because it lies on the frontier of two cultural provinces. To the east is Carlingford Lough, which has been suggested as one of the principal entries for the horned-cairn culture, owing to the concentration of such monuments round the Mournes and the Carlingford Mountains. From it there rise steep granite slopes, often with gravel terraces, and in the main free from that mantle of boulder-clay whose luxuriant vegetation made progress difficult to early man. The excavations at Clontygora have demonstrated a further attraction, an abundant supply of flint-pebbles in the stream-beds and beaches round Newry. To the south of Slieve Gullion lies the Leinster plain, watered by the R. Boyne, whose valley has often been a centre of cultural diffusion, and in the neolithic period was the home of the passage-grave culture, of which the classic example is New Grange. The cairns of this type are usually circular instead of long, with no horns or forecourt; their foreign prototypes are to be found in Spain rather than in Sardinia. They just reach the Slieve Gullion massif, but save for a few isolated and compact groups,(1) they do not occur farther north. A well-known example is the Calliagh Berra's Cave on the summit of Slieve Gullion,(2) and others may be the secondary chamber at Annaghmare(3) and the small cairn at Clontygora.(4)

The monument here described lies in the townland of Clontygora, about $1\frac{1}{2}$ miles east of the customs-post on the Newry-Dundalk road.(5) It is situated on a small platform on the southern slope of a shallow valley. The forecourt faces the stream about a hundred yards away, but the northern slope of the valley precludes a distant view. It has in general been observed that the builders of long cairns did not select conspicuous positions, while the northern aspect, which is unusual, may be accounted for by the gentleness of the slope. The monument is locally known as the King's Ring. A short but adequate description of its appearance before excavation was given twenty-five years ago.(6)

The monument belongs to that class known as horned cairns, of which so many have in recent years been identified in Ulster that it may be claimed as the centre of distribution of that culture. The size of the stones and chambers

(1) Cp. *Ulster Journal of Archaeology*, I (1938), p. 7.
(2) D.S. Armagh, sheet 28 plan 12 trace 3.
(3) O.S. Armagh, sheet 27 plan 15 trace 6.
(4) O.S. Armagh, sheet 29, 9·8″ west, 15·9″ south.
(5) O.S. Armagh, sheet 29 plan 11 trace 6, altitude 560 ft.
(6) Hall, *J.R.S.A.I.*, XXXIV (1904), p. 71.

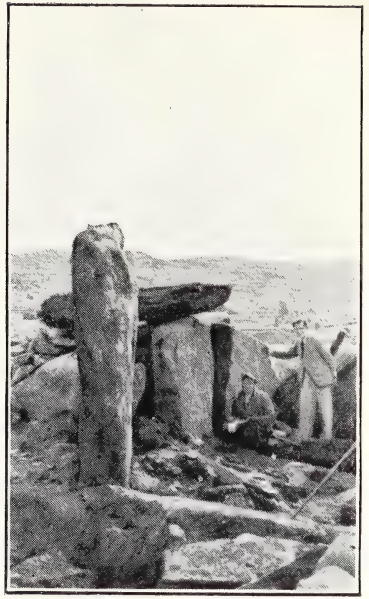

Plate 1.

Forecourt looking South-west.

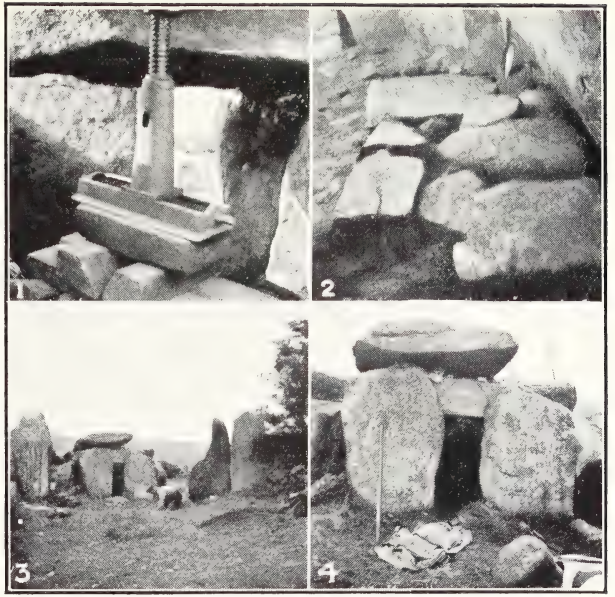

Plate 2.

1. Chamber I showing jacks to support roof during excavations
2. Paving of Chamber II.
3. General view of Forecourt.
4. Entrance to Chamber I.

at Clontygora are unparalleled, and point to it as having been the finest and most impressive specimen of its class. Unfortunately, however, it has suffered extensive damage. Local tradition states, no doubt correctly, that it was once covered by cairn. Cairn-stones were removed about two hundred years ago for the construction of the first lock on the Newry Canal; others, as is commonly the case, may have been used to build field-dykes. But at Clontygora stone-seekers also turned their attention to the large uprights, which are more often spared owing to the difficulty of digging them out and breaking them. About a century ago the rebuilders of a quay at Narrow Water ferry were empowered to remove such stones as they desired. It is said that they soon desisted from this vandalism owing to an accident which aroused their superstitions; but two iron wedges embedded in the tallest western horn-stone are a memento of their work. Apart from roof-stones, which may have been taken earlier, it appears that only a few large stones are missing; and much more damage seems to have been done by the enclosure of the land, probably at the same time. The two horns were more or less incorporated in field-walls, but the line was unfortunately continued diagonally to the chambers, so that while Chamber I remained practically intact and provided us with an important stratified series of pottery, half of Chamber II and the whole of III have disappeared. The cairn and peristalith were torn up with a thoroughness unusual in Ireland. Two large stones were buried, and the stratification was further disturbed by a drainage-ditch parallel to the field-wall. Thus almost all the material derived from Chambers II and III lay in the disturbed area. This was particularly unfortunate, both because the treatment to which the sherds have been subjected has made it impossible to join pieces which would probably have fitted had they remained in situ, and because the large collection of pottery from the rear part of the monument clearly belongs to more than one period, but there remained no evidence of the stratification.

The monument passed by the Land Purchase Act under the guardianship of the Armagh County Council, which enlightened body has always taken effective steps to protect the sites in its control. Permission to excavate was readily granted by it to the authors of this paper, and the neighbouring farmer, Mr. O'Hara, also kindly allowed excavation in the surrounds of the stones. The work was carried out in July and August, 1937, and lasted 3½ weeks. The party consisted of the authors, Mrs. Anderson, Miss M. Gaffikin, and Mr. R. J. M. Irvine. We were lucky in securing the services of Mr. W. Bann as foreman, and two men were continually employed. Grants were given by the Archaeological Section of the Belfast Natural History and Philosophical Society and by the government unemployment fund for archaeological research. Thanks are also due to the Armagh County Council for the loan of surveying instruments. The excavations were visited by the South Armagh Ramblers Club and by many distinguished people from inside and outside the county. The weather was good, and the work progressed favourably, despite political incidents in the immediate neighbourhood.

The Forecourt. (Plates 1, 2 3.)

The monument is approached on the north by a roughly semicircular forecourt bounded by upright stones, whose main function was to hold back the cairn. They are bedded on to but not into till, and though they seem to have been supported in front by a few boulders, they would not have been able to withstand great pressure, and the cairn-stones must have interlocked and so been mainly self-supporting. On each side of the portal-stones is a gap of 3½ ft., but partially filled by the sidestones of Chamber I. In these positions there must have been dry walling, such as may still be seen between the horn-stones at

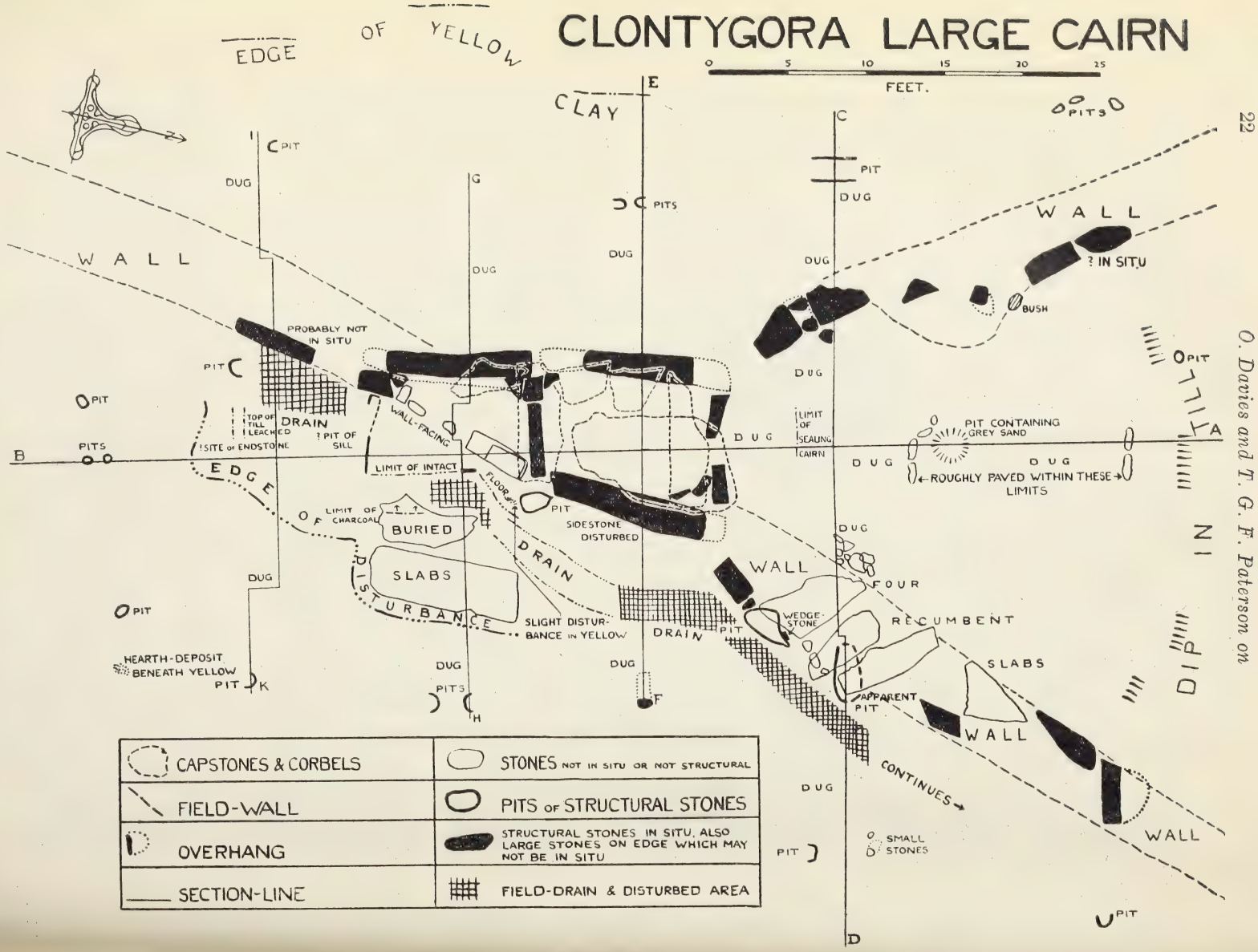
CLONTYGORA LARGE CAIRN
0 5 10 15 20 25
FEET.
EDGE OF YELLOW CLAY
WALL
DUG
PIT
PITS
PROBABLY NOT IN SITU
DRAIN
? PIT OF SILL
TOP OF TILL LEACHED
SITE OF ENDSTONE
WALL-FACING
LIMIT OF INTACT
FLOOR
LIMIT OF CHARCOAL
BURIED SLABS
DISTURBANCE
SLIGHT DISTURBANCE IN YELLOW
SIDESTONE DISTURBED
HEARTH-DEPOSIT BENEATH YELLOW
LIMIT OF SEALING CAIRN
PIT CONTAINING GREY SAND
ROUGHLY PAVED WITHIN THESE LIMITS
? IN SITU
BUSH
FOUR RECUMBENT SLABS
WEDGE-STONE
APPARENT PIT
CONTINUES
SMALL STONES
DIP
A
B
C
D
E
F
G
H
K
CAPSTONES & CORBELS
FIELD-WALL
OVERHANG
SECTION-LINE
STONES NOT IN SITU OR NOT STRUCTURAL
PITS OF STRUCTURAL STONES
STRUCTURAL STONES IN SITU, ALSO LARGE STONES ON EDGE WHICH MAY NOT BE IN SITU
FIELD-DRAIN & DISTURBED AREA

Fig. 1

Cullamore.[7] The use of contiguous orthostats in the horn is rare, but we cannot now discover whether any reasons other than those of convenience determined the alteration of walling and upright slabs.

The first two stones on the west stood nearly nine feet above the ground (section CD). Between their bases were found several boulders, probably to keep them apart; the first stone leans against its neighbour (section AB), and may have partially toppled over. The shapes of these two stones are peculiar. Though they can hardly be regarded as symbolically male and female,[8] like the pairs found in various part of Tyrone,[9] they strikingly resemble the pair at Carneddau Hengwm (Merioneth),[10] and it is difficult to resist the conclusion that they were selected for some especial purpose.

The remaining uprights of the western horn are smaller. Attention may be drawn only to the outer two. The plan shews that these diverge from the semicircular line in a surprising way, and that they rather suspiciously form the facing of a field-wall. This was unfortunately not observed during the excavation, and subsequent difficulties with the farmer made a secondary test impossible. But it is hard to resist the conjecture that they formerly stood several feet to the east, between the bush and pit on the plan. In this case the horn-stones would have described a horseshoe-shaped figure slightly larger than a semicircle, like the forecourt of Clady Halliday (Tyrone),[11] and the portal would have been eccentric, as at Goward,[12] Browndod,[13] and other admittedly early horned cairns.

The eastern horn has suffered more severely than its fellow (cp. AB elevation, section CD, Plate 1). Adjoining the portal is a stone even taller than its counterparts on the west. Beyond it is a low stone, which would have separated it from its neighbour, the pit of which was found, together with a small wedge-stone (see plan). In this pit probably stood the recumbent slab now partially overlying it. It is at present less than six feet long, but seems to have been smashed, perhaps at the base. Next to it are two other recumbents, now forming the base of the field-wall. Beside the first is a low upright $1\frac{1}{2}$ ft. high, bedded on the black a little above the yellow, and so probably not original. Below the first recumbent are two flat stones bedded in yellow, and then an irregular shallow pit not sharply distinguished from the ditch (section CD). It was not possible to lift these two recumbents in order to explore this area more fully; but it seems not unlikely that the pit once contained the second recumbent, a thick lumpy stone, while the flat stones may have formed the base of dry walling. In view, however, of the disturbance in this sector, no certain reconstruction is possible.

In the outer part of the eastern horn four stones were found, of which three were upright, embedded in the field-wall. The first is probably in situ. The second is recumbent, but may have been thrown down near its original position. As to the authenticity of the third I am doubtful; its face is suspiciously flush with the field-wall, and it may at least have been moved slightly backwards. The fourth stands at a high level; if in situ, it forms part of the peristalith, of which more anon.

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(7) Tyrone, O.S. sheet 65 plan 6 trace 6. Macalister, *Ancient Ireland*, p. 43.
(8) Cp. Fleure, *Antiquaries Journal*, XVI (1936), p. 373.
(9) The most significant is Sandville, O.S. sheet 2 plan 11 trace 1.
(10) Hemp, *Archaeologia Cambrensis*, (1936) p. 25.
(11) *B.N.H.P.S.*, (1935/6) p. 76.
(12) *B.N.H.P.S.*, (1932/3) p. 90.
(13) *B.N.H.P.S.*, (1934/5) p. 70.

The forecourt seems to have been bounded on the north by a dip in till which runs roughly in the arc of a circle (see plan, section AB). On the north-east this dip coincides with the end of the yellow clay, and near the eastern horn the fall is sharp, and the soft yellow earth beyond looks like natural pond-filling. On section AB the yellow not only ceases at the further end of the depression, but becomes in this part discoloured and probably disturbed.[14] On the north-west outside the dip was found in the till a pit of soft yellow clay with a fragment of charcoal. Whatever the meaning of the yellow layer, this dip is probably significant. Very little is known about the front edges of forecourts, but both at Browndod and at Ballyalton[15] were found traces of a semicircular line of small stones in a similar position.

Over the central part of the forecourt we observed the following stratification (sections AB, CD). Overlying the yellow boulder clay is a thin layer of soft pale yellow earth. This is almost certainly to be regarded as the natural B-horizon, especially as there are traces of iron-pan on it. It yielded no finds save a little charcoal (66), both between the two tall western horn-stones, where it would have been disturbed and replaced to set them, and near its edge on the north-west of the forecourt (87). Just outside its edge on the north-east was found a coarse flint flake (79). The edge of this layer on the north side of the forecourt may be due to denudation, or more probably to its having been dug away to create a sacral boundary of the forecourt, represented by the dip in till alluded to above.

Above the pale yellow layer is a layer of orange-yellow earth. This colour-transition corresponds to the natural processes of podsolisation, and as the only find in this layer was a small pocket of hazel-charcoal (33) which may have been introduced accidentally, it may also be regarded as natural. In it, rather west of the centre of the forecourt, was a pit containing hard grey clay with root-holes, with some stones at the bottom and a large covering stone. It contained no finds and may be of natural origin; but one is tempted to regard it as a sacrificial pit used in the lay-out of the monument and then sealed by paving. A pit with similar filling was found in the corresponding position at Clady Halliday.[16] At Browndod,[17] a standing stone in the centre of the forecourt seems to have been inserted *after* the completion of the structure. The pits at Clontygora and Clady Halliday could not, from their position and the hardness of their filling, have held standing stones.

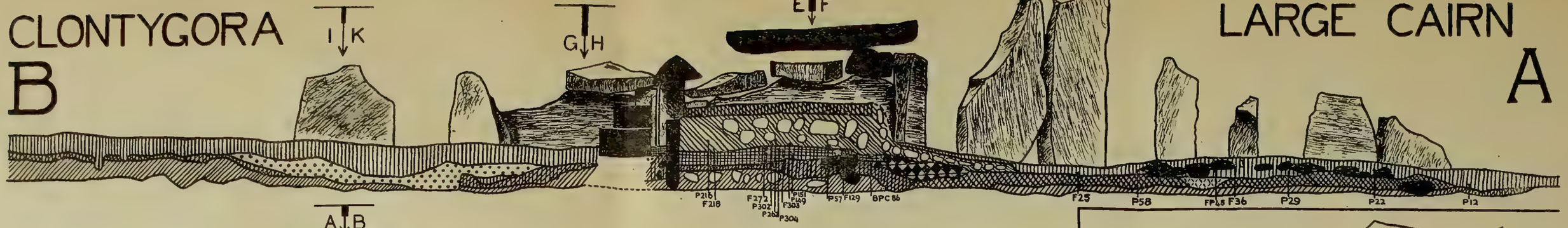
Above the orange-yellow is a thicker layer of brown subsoil, with a rough paving bedded usually rather above the top of the orange, over the central area of the forecourt (see plan, section AB). The turf sinks slightly in the neighbourhood of trench CD, so the pavement may there have been removed by recent disturbers. On and among the paving-stones, and on the orange where they were absent, we found a good many tiny fragments of neolithic pottery (pot A, see below page 33, fig. 3), three flint flakes (25, 36, 45), and charcoal (2, 16, 58, 61). In the topsoil and down to the pavement there also occurred chips of modern glass and coal and a copper pendant, which has been examined by the Victoria and Albert Museum and pronounced to be stamped work of no considerable antiquity.

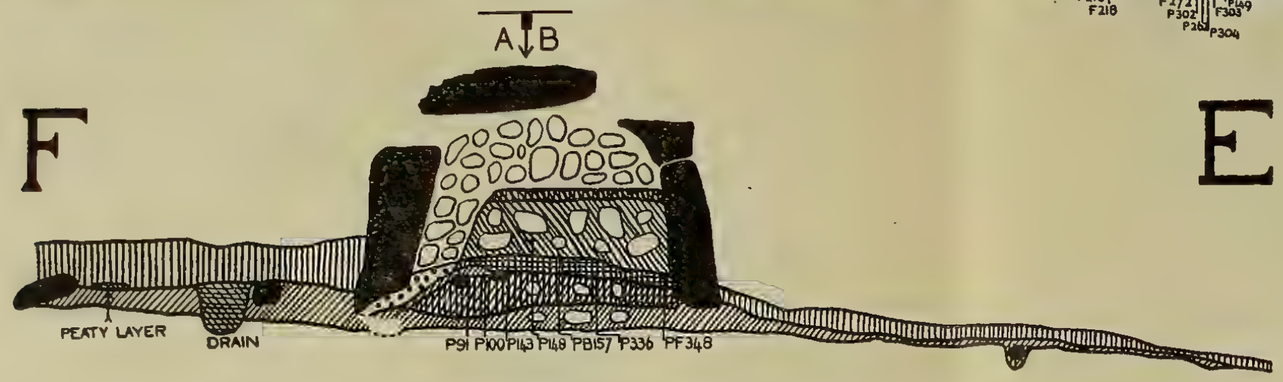
In the south-eastern part of the forecourt were found a number of boulders in the subsoil (see plan, section CD). At a low level among them was a piece

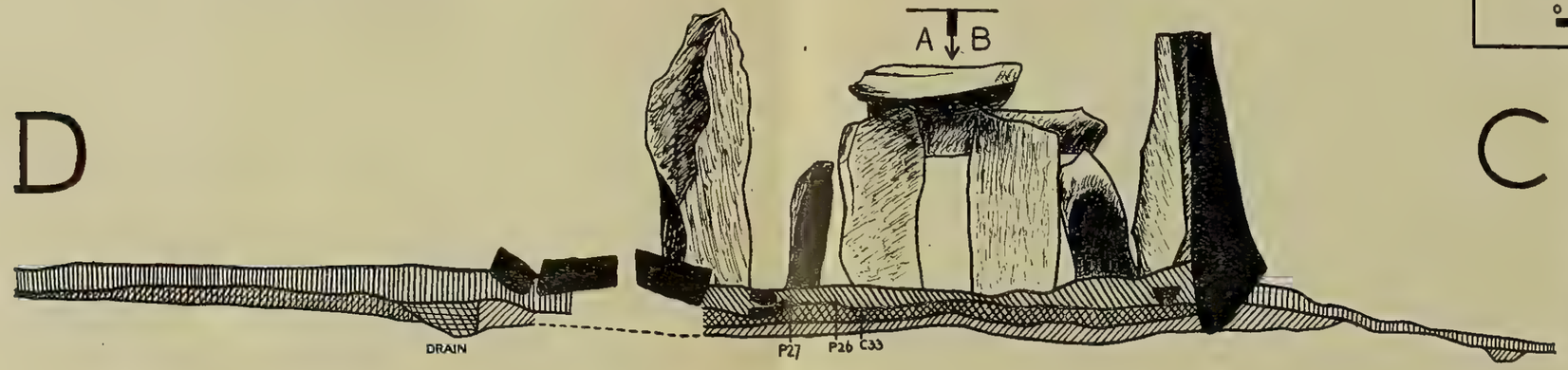
(14) It contained fragments of charcoal 4 and 17.
(15) *B.N.H.P.S.*, (1934/5) p. 70, (1933/4) p. 79.
(16) *B.N.H.P.S.*, (1935/6) p. 76.
(17) *B.N.H.P.S.*, (1934/5) p. 70.

CLONTYGORA

LARGE CAIRN



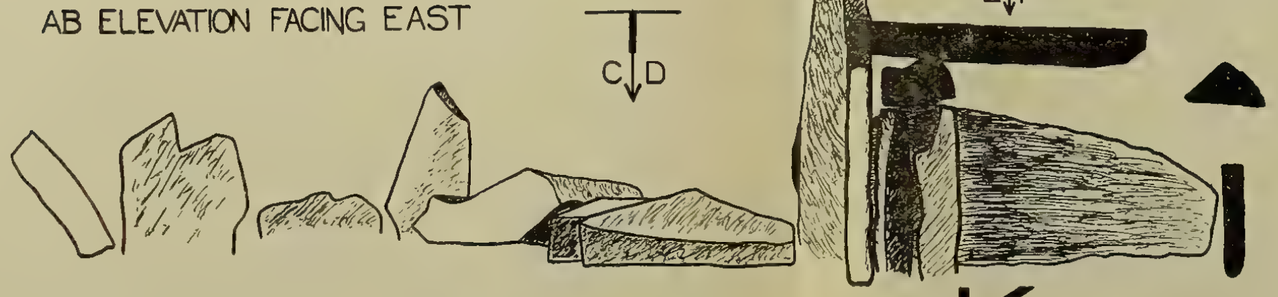


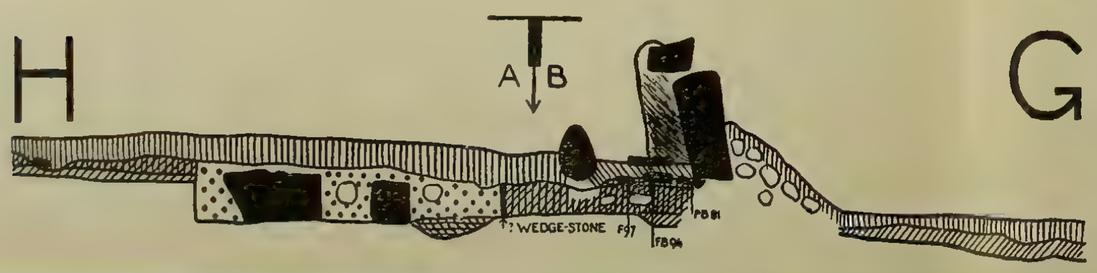


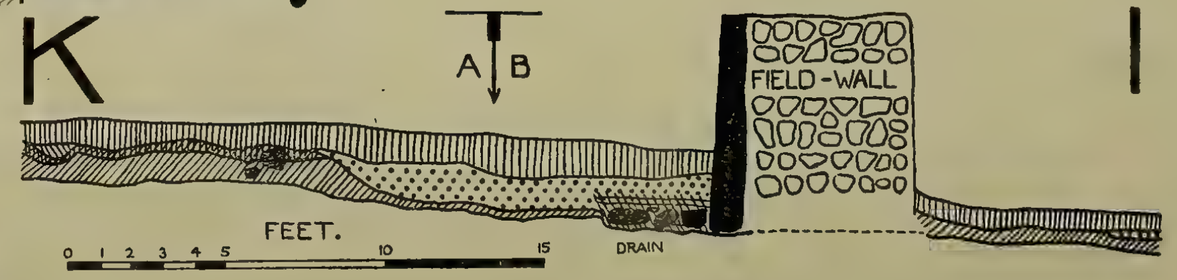
	SUBSOIL, BROWN OR DARK
	YELLOW
	ORANGE-YELLOW
	DIRTY YELLOW, BROWN OR GREY
	YELLOW-BROWN
	BLACK
	BURNT LAYER, CHAMBER I
	DRAIN, BLACK OR YELLOW WITH STONES
	MIXED BLACK & YELLOW, DISTURBED
	TIGHTLY WEDGED CAIRN
	HARD GREY
	STONES IN AREA
	STONES, MEASURED
	SECTION-CROSS

FINDS INSERTED WITH INVENTORY-NUMBER & INDICATORY INITIAL : B = BONE , C = CHARCOAL , F = FLINT , P = POT.

AB ELEVATION FACING EAST







of an iron lamp. They are probably not an ancient feature, but part of a field-drain accompanying the wall and corresponding to the deeper drain on the other side.

In general, horned cairns appear to have been closed after use with a bank of stones or earth in front of the portal. At Browndod the sealing cairn extended a considerable distance over the forecourt. At Goward and Ballyalton a bank closed the entrance, once probably nearly to the lintel, though as we found it it was lower. At Clady Halliday the forecourt was left almost clear, but the front chamber was packed with loose stones. The system at Dunloy was similar.[18] At Loughmacrory Carnanbane[19] there appears to be a horned cairn with forecourt covered by cairn-material. Horned cairns which were used for more than one burial seem to have been left open temporarily, as traces have not yet been found of the sealing being partially removed and replaced. Contrary to the usual practice, Clontygora must always have remained open. The finds of bronze-age pottery in Chambers I and II might indeed be explained by people forcing an entrance at the side; but though this was common at the beginning of the iron age, some of the sherds seem to belong to the early or middle bronze-age tradition, when such practices are not established (e.g. pots E L M, fig. 3). It is more significant that the stratification shews that Chamber I was not filled to a height of more than two feet in the bronze age,[20] and in the forecourt was little trace of sealing bank (section AB). Just in front of the portal tightly wedged stones with a little brown earth were found let into the yellow subsoil; but they do not rise more than 1 ft. 6 in. above till, and seem rather continuous with the yellow-brown layer of Chamber I. Above and beyond these was a thin layer of loose stones with black earth, at the base of which was found a piece of a bedstead; they may have been placed anciently, but they seemed rather to be continuous with and an overflow from the upper part of the filling of Chamber I. In a pocket of looser material among the tightly sealed stones at the side of the eastern portal-stone was found a sherd of the iron-age pot B2 (103), of which other pieces turned up inside the chamber, near the base of the black filling.

Chamber I.

Chamber I is slightly over ten feet long and on an average seven feet wide. The entrance on the north is flanked by two massive portal-stones (cp. section CD). The eastern one was placed into a pit in till two inches deep and sank one inch further, the sides of the pit being filled with light yellow soft clay. (Plate 2 4.)

The sides of the chamber are formed by two enormous boulders of granite split longitudinally and keyed behind the portal-stones, according to the normal system of construction in larger horned cairns. Neither was bedded within several inches of till, and they are not so tall as the portal-stones, being intended to receive corbels like those at Clady Halliday (cp. sections AB, EF and AB elevation facing east). The western sidestone is bedded just into the yellow layer.

The most remarkable feature of the western sidestone is a series of shallow horizontal and vertical scorings on its inner face (cp. drawing on fig. 2). These were made with a rude instrument, and some are duplicated or triplicated. There can be little doubt that they are artificial. They could be traced down to just above the top of the yellow-brown layer, and presumably therefore were subsequent

(18) Evans, *Ulster Journal of Archaeology*, I (1938), p. 59. For the evidence from Ballyutoag cp. p. 43 of this volume.

(19) O.S. Tyrone, sheet 27 plan 14 trace 3.

(20) N.b. also that the inner surface of the western sidestone is more weathered above than below the yellow-brown layer.

to its deposition, that is probably during the reoccupation evidenced by pottery of the late bronze age. They could have no function in splitting the stone, and they are quite unlike the magical symbols found on many passage-graves. It would be unprofitable to speculate further as to their meaning.

The eastern sidestone is undoubtedly out of place. The rounded boulder-form of its upper surface gives way in the southern half to an angular section, with which it slopes down nearly to ground-level; it is probable that part of it was split off and removed. The plan shews further that an attempt was made to slew it round in order to align it with the face of the field-wall. On the north there is a gap of several inches between it and the portal-stone (see section CD). On the south it should be keyed behind the eastern jamb, which stood in the pit marked on the plan. This stone was, however, removed, and with it perhaps a betyl corresponding to those in the south-west and north-east corners (see below here). The stratification against the inner face of the sidestone was equally indicative of disturbance (see section EF). Only at the extreme southern end does it rest against the yellow-brown layer, presumably against that face which originally abutted on the betyl. Elsewhere, the loose top-filling extends nearly to the base of the sidestone, and below it was soft mixed yellow earth.[21] In the disturbed area we found a clay pipe and a piece probably of a flue-brick, as well as ancient sherds derived from the original filling of the chamber,[22] two flint-flakes (64, 139), and several bones.[23]

At the south end of Chamber I a still-stone, bedded on till, gave narrow access to Chamber II. It was flanked by a pair of jambs, of which one has disappeared. The other seems to be in situ; the curious inward curve of its apex may have been intended to narrow the aperture still further, after the manner of the porthole-entrances found in various early types of megalithic monument. The sill-and-jamb construction is common, though not universal, in Ulster horned cairns.

Particularly worthy of note are the betyls supporting the corners of the chamber (see plan, section AB, AB elevation facing east). There are two in the north-east corner and one in the south-west, also one in each of the two surviving corners of Chamber II. It has been suggested above that one has been removed from the south-east corner of Chamber I. In the north-west corner the yellow floor was merely banked up and strengthened with a few small stones. The top of one of the betyls in the south-east corner has been broken by the weight of the cross-slab. Between these two betyls are a few stones of dry walling. All the betyls are buried deep, apparently on to till, but for reasons of security it was not thought advisable to probe beneath them. Betyls of this type were occasionally used in megalithic architecture, as at Clady Halliday. Though the completed structure would have stood firm owing to the weight of the superposed cairn, they doubtless helped to steady the uprights while the roof was being constructed, a moment when accidents were most likely to occur.

The larger horned cairns were normally roofed by one or two tiers of corbelling resting on the sidestones, counterweighted by cairn and supporting cross-slabs which bridged the central area. The narrower portals would be spanned by lintels, approximately level with the central cross-slabs, so that the

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(21) There was a pocket of soft yellow earth at 1 ft. 6 in. south of EF, 9 in. east of AB, slightly above the mixed earth among the loose stones.

(22) From pot F 112, B 113 114 121 125 128 130 134 139, B2 44, G 123 126

(23) 111 118 Equus, 67 animal unidentifiable, examined by Miss D. Bate ; for her report on the animal-bones see below p. 41.

effect would have been roughly that of a false barrel-vault. We do not find in the horned cairns the coursed corbelling with small stones, like that at New Grange and Slieve Gullion, which has close parellels in the Mediterranean region. At Clady Halliday sufficient corbel-stones remained to attempt a reconstruction of the roof; a good many may also be seen at the horned cairn of Balix.[24] Chamber I at Clontygora is covered by a number of stones, but the disturbance, which it has undergone, makes any restoration exceedingly difficult. It is best therefore first to describe the position of the stones as found.[25]

Two medium-sized stones rested on the western sidestone of Chamber I and one on that of II. Both these sidestones are lower than the adjacent portal-stones, and almost certainly supported intermediate corbels. The top of the sidestone of I seems shaped (cp. section AB) with three peaks and four depressions; the rounded forms of the latter would fit well the glacial boulders so much used in the construction of this monument. The northern superincumbent stone fitted the sidestone, and was probably in situ; its north side may have been broken. Its top is slightly lower than that of the entrance-portal, but the relative heights of this and the second portal suggest that the roof of Chamber I tilted slightly backwards. The southern stone may have been disturbed; it would fit better if slewed round so that its thin end rested on the northward rise of the sidestone. A similar stone overlies the sidestone of Chamber II, but the condition of this chamber makes it difficult to admit more than the possibility that it is in situ.

The north end of Chamber I is covered by a long split granite boulder of roughly rectangular section. The way in which one of the betyls is smashed suggests that this stone fell on it. On the other hand, it hardly seems to be the front lintel, as its shape and thickness would not allow it to fit the portal-stones well, unless it rested largely on a pair of corbels behind them. Its present position would be unusual in megalithic architecture, though it is not likely to have moved far to it. (Plate 2 1.)

Over the south portal is another long stone. Its east end rests on the field-wall, but it is not improbably a lintel, having been broken at the time when the eastern portal-stone was extracted.

The larger part of Chamber I is covered by a colossal granite boulder split longitudinally, resting on the cross-stone behind the north portal and on loose filling. Its eastern side and south-east corner seem broken, otherwise it is probably complete with the original bevelled faces. Its lower surface is damaged by fire, except at the north end which was protected by the cross-stone; it is probable that the burnt layer in the upper part of Chamber I was due to an attempt to split it. It cannot be in situ, but can hardly have shifted far from its original position. We think that it can be best restored as covering the central part of the chamber. It may well have been levered forwards in an attempt to dislodge it. Supposing that the cross-stone is the lintel of the entrance-portal and that the eastern sidestone supported corbels like the western, the capstone would have covered effectively the intervening space, resting on two rows of corbels, and abutting against the lintels at each end of the chamber.

The stratification of Chamber I was undisturbed, save along the east side as already explained, and at the north end, where the upper filling had been

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(24) O.S. Tyrone, sheet 6 plan 14 trace 6.

(25) See plan and sections, which shew the positions before excavation. An accident to the jack while we were working caused the largest capstone and the northern corbel on the west side to shift.

removed behind the portal though it was intact towards the corners.[26] The chamber was floored with yellow clay, which contained many deeply wedged boulders and a certain amount of hazel-charcoal,[27] but no other finds. This must be regarded as artificially laid down, as it abuts against the sill and portal-stones. It is separated by a browner deposit from the probably natural yellow layer of the forecourt, but seems continuous with that outside the sidestones. It would not be contrary to analogy to suppose that the site of the monument was floored with clay before the uprights were erected; but the question of the yellow layer outside the chambers will be discussed more fully below. Ritual clay-floors have been found at several megaliths, and their extent and the order in which they were laid relatively to the erection of the uprights varied.

Above the yellow clay was a fairly thick layer containing a good many stones. It was possible to divide it with tolerable accuracy into a lower gravelly brownish-yellow and an upper clayey yellow-brown stratum, but neolithic pottery was found through the whole area, though in general more frequently in the upper levels.[28] The earth sometimes had a grey colour, and at the north end there appeared to be an artificially constructed pit lined and paved with stones and containing browner earth and pieces of pot G (86; see section AB). The layer contained a good deal of charcoal,[29] numerous sherds of pots G H and I, a polished axe (277), eighteen flint-flakes,[30] seven hollow-scrapers [31], two pear-shaped scrapers (295, 297), and a good deal of cremated bone.[32]

On top of the yellow-brown was a fairly thick dusty black layer containing many loose stones. Its uncompacted texture would account for a chip of glass being found in it. At its base were a certain number of sherds of pots D, E and F, two chips (59, 331) and one flake (276) of flint and a hollow scraper (341). Through the layer were a good many sherds of pots B, B1, B2 and C, one or two of F, two flint flakes (40, 43) one hollow scraper (338), one chopper (260), and pieces of bone[33] and charcoal,[34] which may be derived from the overlying burnt layer. It is difficult to determine the meaning of this black stratum. Pots seem to have been deposited on top of the neolithic floor, but we did not find an occupation-horizon to account for the further accumulation, nor was the chamber apparently used for burials in the iron age. We are inclined to think the layer ancient, though it is possible that the cairn was partially removed and the chamber exposed several centuries ago, after which there accumulated in it much wind-blown dust, stones from the fields, and the pieces of pottery whose date cannot be determined with any certainty.[35]

The topmost six inches of the black layer contained a great quantity of charcoal, mainly of hazel with a little willow and gorse (3, 24), sherds resembling

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(26) In the loose disturbed material were found two pieces of pot B (55 92), and two bones, 7 a proximal phalanx of Equus, 9 unidentifiable.

(27) 136, 152. I am indebted to Mr. M. Y. Orr of the Royal Botanic Gardens, Edinburgh, for kindly examining the charcoal from this site.

(28) N.B. especially that there were no flints and almost no pieces of bone in the brown-yellow layer.

(29) In the brown-yellow hazel with a little willow-poplar, 107 142 249 ; in the yellow-brown hazel with a little gorse, 74 86 196 248 329.

(30) 75 77 129 170 200 215 272 275 281 289 292 293 294 296 303 324 329 350.

(31) 174 238 285 290 320 337 348.

(32) 86 90 162 171 175 187 254, see below p.

(33) Unidentifiable animal bone 11 38 160, upper cheek-tooth of sheep or goat 80, cremated bone 46 166, see below p. 41.

(34) 73 hazel with a little willow-poplar, 11 137.

(35) The cairn and roof of Chamber II must have been removed before the field-wall was built a century ago, as deep root-holes were found in the yellow floor.

those found lower down (18 from pot C), modern detritus, and one or two animal-bones (4, 6). Charcoal was not present in the disturbed areas on the east and north sides of the chamber, and the layer is much broken up near the west side-stone. The section EF suggests that it was dug through near the east sidestone when that was being shifted; but in the underlying disturbed area was found part of a clay-pipe under some stones in such a position that the burnt layer must be subsequent to the disturbance. The two acts were probably nearly contemporary, as the thick deposit of charcoal seems derived from a fire kindled in order to split the roof-stone.(36)

Above the burnt layer were many stones with glass, bones,(37) and other modern detritus thrown in from the surrounding fields.

Chambers II-III.

Less than half of Chamber II survives, and its filling was almost entirely removed in order to construct the field-wall. A great deal of material was probably thrown into the disturbed area to the east, where we found much pottery of various periods. The facing of the field-wall runs diagonally across the chamber, and its stones have been sunk slightly into the yellow floor.

The sill, north-west portal-stone and betyl are bedded on to till and packed round with yellow clay, rather mixed and containing grey patches, root-holes, and some small stones packed fairly tightly (section AB). Charcoal was found at all levels through this layer (1, hazel and willow-poplar; 117, 153, 189). Above the yellow is a flat paving set in a thin yellow-brown layer, which seems to have formed the floor of the chamber. This underlies a black layer, on which are a few more flat slabs. In it were found many fragments of charcoal and cremated bone, extending in pockets as far down as the yellow-brown, among and below the paving-stones.(38) These pockets also contained a few sherds of pots K1 and R (21, 81, 95), and three small flakes (94, 96, 97). (Plate 2 2.)

The western sidestone of Chamber II rests on a layer of small stones which overlie the yellow floor (section GH). Its base is consequently high, but it need not be supposed to have been shifted in modern times. Dry walling was found beneath some of the sidestones at Ballyalton, and their depth depended on the thickness of the available corbels, which it was their function to support. In this case only a narrow sidestone and thin corbels seem to have been to hand.

The destruction of the rest of the monument makes any attempt at restoration highly conjectural. East of the line of the field-wall in Chamber II we found a patch of yellow floor which seemed to have been left intact, extending to about 1 ft. 3 in. east of section AB, where a low upright stone nine inches long might have been a wedge for the sidestone (see plan, section GH). This position would however narrow the chamber considerably and make it asymmetrical with its northern portal. Beyond the small upright on section GH were ten feet of disturbed material, with a field-drain sunk into till and filled with soft yellow clay; but further evidence was obtained north of GH, where there was a slight disturbance 2 ft. 9 in. east of AB, and the line of the modern excavation diverged to the north-east. The plan would suggest that the east sidestone ought to have been keyed behind the portal-stone, and to have stood roughly parallel to AB

(36) See above p. 27.

(37) 10 Equus, mar ᵑ b'e with two milk molars ; 197 Equus, milk cheek-tooth ; 13 and 240 vertebrae.

(38) Charcoal, from the yellow-brown 108 hazel and gorse, 154 ; from the black 32 82 99. Cremated bones, 23, from a pit in the yellow floor, apparently due to the erection of one of the stones of the field-wall ; also 31 81 95 98 127 154 189 ; see below p. 42.

and about 3 ft. 6 in. east of it. It seems significant that south of GH this line would have corresponded approximately to the limit of charcoal in the lowest part of the yellow floor, which had not been completely dug out.

The large disturbed area east of the intact yellow floor was filled with mixed black and yellow earth, sometimes patchy and sometimes almost stratified. In it were some small stones and two large recumbent slabs, the burial of which was probably the object of the disturbances. The larger is almost certainly the eastern sidestone of Chamber II which was overthrown but otherwise hardly shifted. The smaller may be a corbel-stone.

The mixed earth contained a great number of flints and sherds of pots K1, K2, L, M and O. It has already been stated that there were pieces of pots K1 and R on the undisturbed yellow floor beneath the field-wall. Further sherds of both these pots turned up in the pure yellow layer between field-wall and ditch, as well as one flint flake (234), a roughly chipped arrowhead (390), and a little cremated bone (372).[39] These two pots may therefore be assigned to Chamber II, as perhaps also pots P and Q, of which the sherds were found in the pit of the missing north-east portal-stone of the chamber. The fabric of pot R suggests that it is considerably post-neolithic, though it had no significant shape. Some of its sherds were found in crannies in the intact paving, which must have been left exposed by the neolithic people. Consequently it is unlikely that Chamber II was filled like I, and the major part of its floor was found in situ.

The rest of pot R was found in the mixed yellow and black layer of Chamber III, and there were many sherds of K1 in the same layer of both chambers. It seems therefore that, so far as the floor of Chamber II was dug away, the earth was largely thrown to the south, and was not used to cover the buried slabs. Of the other pots, N came from the south part of the disturbed area, K2, L, M and O mainly from the north-east, along with a large number of flints. Some of these pots are represented by too few sherds for an argument ex silentio to be convincing; but their absence from the undisturbed floor of Chamber II suggests that they, as well as the very numerous flints found in the disturbed area, lay in Chamber III. This enables us to form an idea of the contents of this chamber. Above the yellow floor there must have been a thick layer of sticky black earth with charcoal. Almost no bone was found in the mixed yellow and black layer,[40] and it is probable that the deposits of cremated bone were confined to the first two chambers.

The existence of a third chamber is proved by the surviving western jamb; no trace whatever could be found of its fellow. The sill probably rested on till, like that between Chambers I and II. The sharp dip in the yellow floor on section AB may indicate its position, while the extension of the disturbed area down to till for over two feet south of this would be due to digging it out. Immediately north of this dip the yellow is rather brown, perhaps because plants grew up against the sill at some period.

In Chamber III only the base of the yellow floor survived, and on the west side even this had been removed to make a drain (section IK). We thought at first that the upright stone facing the field-wall was in situ, but the section shews that the black layer extends beneath it, and even if it is one of the sidestones it must have been shifted westwards. One foot six inches east of its south end

(39) See below p. 42.

(40) Cremated bone, 253 from near the site of the sill of Chambers II and III, perhaps therefore from Chamber II, so 399 from the extreme north of the disturbed area; also 359 381; see below p. 42. 376, four cheek-teeth of sheep or goat. 369 and 398, Equus, from the pit of the missing eastern jamb between Chambers I and II.

was found the beginning of a pit in the yellow, in which the western sidestone must have stood. The end-stone was located east of this pit. Though the filling was cleared here down to till, we found a patch where the top of the till was podsolised to a depth of 1½ in., with iron-pan below, in a cup-shaped section. The till there must have been exposed to unusual conditions, and cannot have been covered by about a foot of yellow clay as over the rest of the area. The most reasonable explanation of this phenomenon is that the end-stone stood on this line, bedded on till, and that acid rain-water trickled down it and set up a podsolising process at its base.

We found no evidence for the position of the eastern sidestone of Chamber III.

The limits of the cairn were more difficult to determine. Over the whole area the till is covered with soft yellow clay. Reasons have been given for thinking that this is natural in the forecourt and artificially set inside the chambers.(41) On the south and east it extended without interruption on both sides of the pits presumed to have held peristalith-stones (cp. sections AB, GH, IK), and if the layer is artificial under the cairn it can at best have been the local subsoil taken up, purified and reset. This makes it impossible to determine the limits of the floor. That it is artificial is suggested by a small hearth-deposit found beneath it outside the south-east corner of the monument (see plan). On the west it becomes very thin and finally disappears, as indicated on the plan and sections CD, EF; but the subsoil is also shallow, and probably has suffered considerable denudation since the enclosure of the land, as the ground slopes westward towards the stream.(42)

Peristalith-stones, being intended to hold up the weight of the cairn, are normally deeply bedded, but in horned cairns seldom more than one or two feet high save along the front facade. Along the west side were found a number of pits in till (see plan, sections CD, EF), though they were absent near and beyond point G. On the south were three pits in the yellow (see plan, section AB), on the east a series of them (see plan, sections GH, IK), and at F a leaning stone which might be a kerb-stone in situ; outside it the yellow layer becomes decidedly grey.

The evidence here presented is far from satisfactory; but supposing that the line of the peristalith has been accurately traced, the most important conclusions emerge. Whether or no the upright set across the field-wall on the north-east is really a peristalith-stone, against which its high level militates (see AB elevation facing east), the front facade on either side of the forecourt must have been square. Behind the horns the cairn seems to have contracted to a width of ten or twelve feet from the side-walls and end-stone of the chambers, the rear end being slightly rounded.

Where previously it has been possible to trace the plan of a horned cairn, as at Clady Halliday and Browndod, it has been found to be long but more or less shapeless, resembling the long barrows of England. One of the principal difficulties in connecting the horned cairns of Sardinia and Ulster has been that in the former the kerb follows closely the line of the interior uprights.(43) Clontygora, however, which from its geographical situation may have been one of the first horned cairns built in Ulster, seems to be a missing link. Its cairn is comparatively narrow and follows the shape of the interior structure. Thus the

(41) See above pp. 24, 28, 29.
(42) A little charcoal, 15 60 165, was found on the yellow layer outside the chambers.
(43) Cp. Mackenzie, *Memnon* II (1909), *Ausonia* (1908), p. 18.

formless long cairn seems to be an accretion picked up after the idea of the horned cairn had left Sardinia, but perhaps before it reached Ireland, in England, or from immigrants from England. It is further well known that in the interior of Ulster we find a type of very long cairn, sometimes double-horned, in which the area of cairn is large compared to that of the chambers,(44) and the chambers themselves begin to break up. This is a feature also of English long barrows, especially of the Cotswolds.(45)

In other respects, however, Clontygora preserves Irish features. Typical of Ireland is the sill-and-jamb construction, though segmentation without jambs is common in the megalithic culture. In Scotland one often finds pairs of thin projecting jambs without sills, not structural but forming divisions in the passage. The Sardinian graves have unsegmented passages. We would suggest provisionally that the massive jambs of the Ulster horned cairns are derived from timber-construction. Megalith-builders sometimes used timber where stone was not available and vice versa. Those who brought the horned cairns to Ulster may have lingered on the way in a timber-country, perhaps in France, where the backwardness of archaeological exploration still deprives us of many links between our own neolithic culture and that of the Mediterranean.

THE FINDS: POTTERY.

A. In the forecourt was found a fair number of minute fragments, often unassignable. The colour is black, the thickness ·2 to ·3 in., the paste and surface fairly fine, with sometimes a slight polish. The fabric seems in all cases neolithic. There are at least two types of rim, one rolled and the other slightly bent out, and two of shoulder, one with marked ledge-relief and the other with very slight angle. We suspect therefore that two pots are represented, though they cannot be sorted out.

B. Many fragments from all parts of the black layer of Chamber I, especially on the east side, and extending down to the base of the layer. The ware is very coarse and gritty, the inside extremely rough, the outer surface has often rubbed away. The colour is reddish or brownish, the biscuit reddish. The average thickness is ·5 in. The pot must have been a large bowl, but the shape cannot be reconstructed save for a heavy flattened rim. It is not easily datable, but may belong to the early part of the iron-age; such wares are not paralleled from later times, for which we have more copious evidence.

B1 consists of three pieces (158, 164, 172) found close together in the black layer rather to the north-west of the centre of the chamber. They may be distinguished from B in being covered by a hard thick yellowish slip, but there were no distinctive shapes.

B2. We are inclined to attribute to a third pot five sherds (44, 103, 155, 159, 216) found scattered and at various levels in the black layer down to the top of the yellow-brown. Their inner surfaces resemble B, but their outer surfaces are covered by a white slip with brush-marks. There are no characteristic shapes, but on three of the sherds is a rough patch bounded by a straight line beyond which the slip begins to appear, which suggests that the pot was covered with encrusted decoration which has broken away.

C. Some sherds from the black layer in Chamber I were of a different character (18 172 257 and perhaps others). They were found near the centre,

(44) E.g. Broughderg (O.S. Tyrone, sheet 20 plan 9 trace 2), Altmore (O.S. Tyrone, sheet 45 plan 2 trace 2), Ally (O.S. Tyrone, sheet 33 plan 9 trace 2).

(45) E.g. Belas Knap and Rodmarton, Crawford, *Long Barrows of the Cotswolds.*

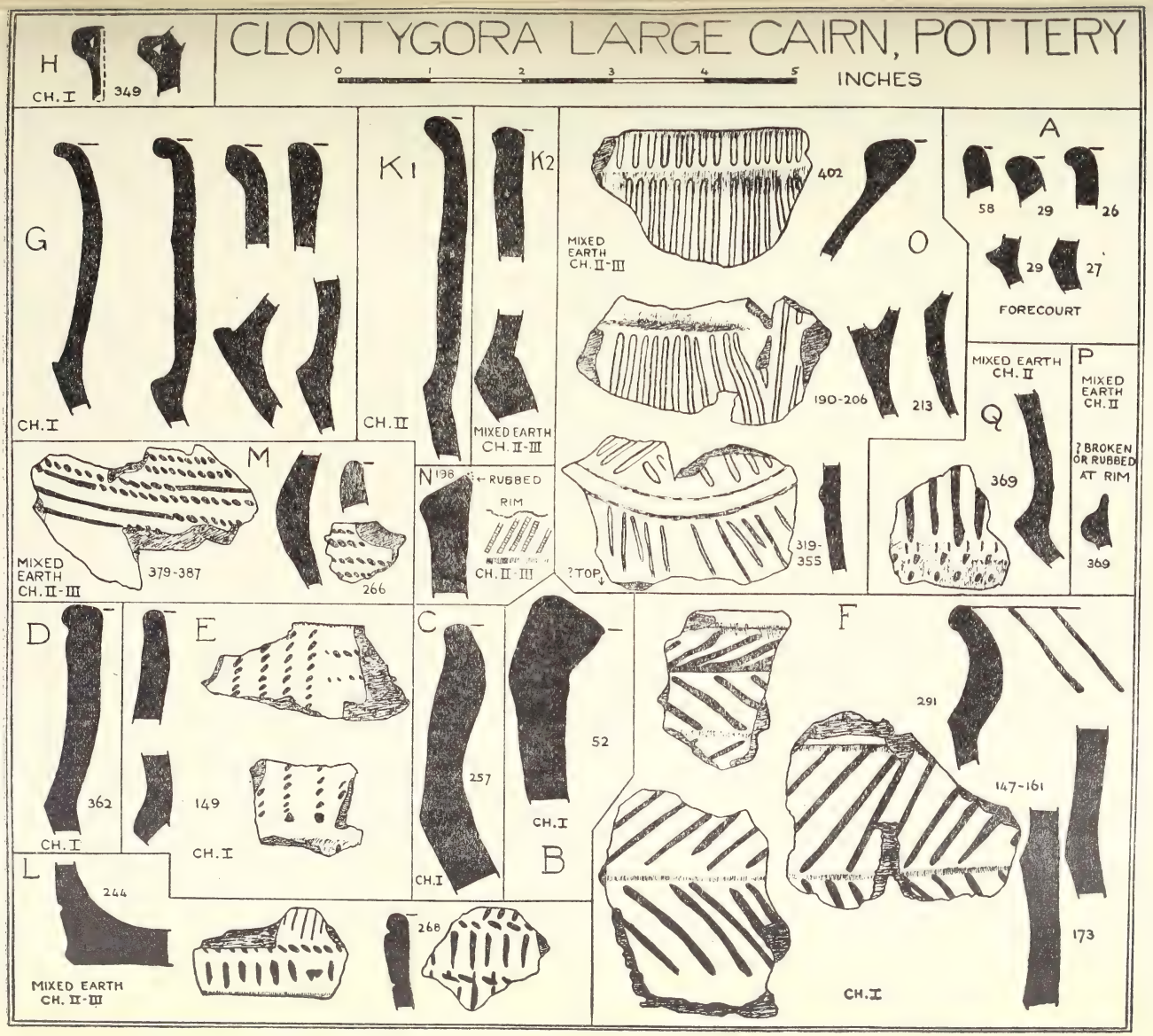
CLONTYGORA LARGE CAIRN, POTTERY
0 1 2 3 4 5 INCHES
H
CH. I
349
G
CH. I
K1
K2
CH. II
MIXED EARTH CH. II-III
MIXED EARTH CH. II-III
402
O
213
190-206
A
58
29
26
29
27
FORECOURT
MIXED EARTH CH. II
Q
369
P
MIXED EARTH CH. II
? BROKEN OR RUBBED AT RIM
369
M
MIXED EARTH CH. II-III
379-387
266
N
198
← RUBBED RIM
CH. II-III
?TOP
319-355
D
362
CH. I
E
149
CH. I
C
257
CH. I
B
52
CH. I
F
291
147-161
173
CH. I
L
244
MIXED EARTH CH. II-III
268

FIG. 3.

in and just below the burnt layer. The outer surface is yellowish and apparently covered with a thick powdery slip, the inner black and sometimes sooted, the biscuit black. There are brush-marks on both surfaces. The thickness varies from ·35 to ·55 in., increasing towards the base. The pot had a rounded rim, slightly bent outwards, and the shoulder was somewhat angular. One fragment apparently came from just above the junction of the base with the walls, and though there was not enough of the outer surface preserved to postulate a flat base, the curve of the inner surface suggested it. The pot looks like a degeneration of English Hallstatt-ware, but it may be of later date.

D. Some undecorated sherds with smooth unpolished surface found in all parts of chamber I at the base of the black layer (63 341 362). The thickness is ·3 in., the biscuit reddish and containing much grit, the surface yellow-brown. The rim is rounded, with a slight groove just below it. 2·2 in. lower is a flattened relief-shoulder, below which the body slopes away. The vessel was large, as on a piece of body nearly two inches across there was only a slight curve. The shape is suggestive of a cinerary urn of the late bronze age, which would fit with the other pots found at this level.

E. Three sherds of a panel-decorated pot (147 149 224) were found at the base of the black layer in Chamber I, close together about one foot south of section EF. It was a small vessel, perhaps six inches across at the rim, and of food-vessel type. The outer surface is brownish, smoothed and slightly polished, the biscuit red, the inner surface rough. The rim is rounded, the shoulder angular, and the body slopes away steeply below it. On the neck is cord-decoration set in panels, and there are slight traces of the same below the shoulder, but the lower part of the body was undecorated save for a few grass-marks. Panel-decoration is often held to be an early feature, but from its stratigraphical position this pot can hardly be earlier than the late bronze-age, and one may compare a cinerary urn from Ovingham (Northumberland),(46) with panel-decoration below the rim, and in the second and third zones cord-ornament set in herring-bone fashion, somewhat resembling the decoration of our pot F.

F. To this pot we have attributed a good many fragments (112 147 148 161 173 225 262 291), found near the centre of Chamber I, mostly at the base of the black layer, though two sherds were at a higher level. The biscuit is black and rather gritty, the inner surface black with brush- and soot-marks, the outer reddish or yellowish, but the colour varies on pieces which join, so must in part be due to conditions subsequent to fracture. The thickness of the neck is ·4 in., of the body ·3 in. The vessel was large, as on surviving pieces there is only a slight curve. The rim is rounded and splays outwards. The ornament consists of coarse diagonal grooves, both on the inside of the rim and on the upper outer surface of the body. The form of the lower part of the body cannot be reconstructed. The pot is clearly a cinerary urn of the late bronze age.

G. In the brown-yellow and yellow-brown layers in all parts of Chamber I were found fragments of undecorated neolithic pottery; there was none in the black layer. The colour and sections of rim and shoulder vary so greatly that more than one pot may be represented. The paste is fine with little grit, the colour black or red, well smoothed and slightly polished The thickness of the neck is ·18 to ·35 in., of the belly ·2 to ·32 in. The rim is sometimes bent out, sometimes rolled, the shoulder is angular or pointed, the height of the neck varies from 2·1 to 2·4 in. On one neck-sherd is a small suspension-hole ·8 in. below the rim. Some pieces from the inside of the belly are sooted. A few sherds with

(46) *British Museum, Bronze Age Guide*, p. 74.

badly preserved surface may be derived from the rounded base. The pot was a wide bowl of ordinary Ulster-neolithic type, apparently, from the profile of the shoulder, shallower than is often the case. The internal diameter at the shoulder was twelve inches. This undecorated shouldered pottery seems to be the local variety of English neolithic-A ware. Though the Scotch parallels are not very close, there is an almost identical vessel from Hanging Grimston Long Barrow (Yorks),[47] and another of coarser ware with very shallow belly from Kilham (Yorks) displayed in the British Museum. A certain amount of this ware turned up at Carn Brea (Cornwall) and there are a few sherds from Hembury (Devon). It has also been found with a plain rim at Kervadel (Finistère),[48] but cannot be traced in this form into the Mediterranean region, where our megaliths themselves seem to have originated.

H. A few sherds were found in the south-west part of Chamber I in the yellow-brown layer (143 279 323 336 342 348 349 358), which cannot belong to pot G. The surface is rough, black on the outside and greyish or reddish on the inside, with rather gritty biscuit; the thickness is ·25 to ·45 in. The vessel must have been fairly large. The only pieces with characteristic shape are what may be a hammer-headed rim, rolled over and with central cavity, and what seems to be an applied lug. The condition of the former does not exclude its being a splaying applied base, but flattened bases are very rare in the neolithic period. This type of rim is paralleled at Ballyalton D4 and at Hedderwick in Scotland,[49] where lugs also are fairly common, though they have been seldom found in Ireland.

I. In the yellow-brown layer in the north-west corner of Chamber I were found three small sherds (229 233 241) of flaky reddish ware fairly well smoothed on the outside; the thickness varies from ·3 to ·45 in. One sherd is ornamented with fine parallel striations. The ware resembles the fabric of small neolithic pots, but none of these pieces had any characteristic shape.

From the disturbed area of Chambers II-III there are almost certainly two undecorated neolithic bowls, though one cannot be certain of all the attributions. In this area was also found a piece of shoulder which we are inclined to assign to pot G, having been thrown out of Chamber I when it was disturbed. There are also some coarse shapeless undecorated sherds.

K1, of which some sherds occurred on the undisturbed floor of Chamber II, was a large shouldered neolithic bowl, of the same type as G. The surface is black, occasionally yellowish or red, and well smoothed; parts of the neck are highly polished, the belly is dull. The paste is fine with a little grit. The thickness of neck and belly are ·15 to ·3 in., of shoulder ·35 in. The rim is rolled, the shoulder in flat relief. Three sherds have suspension-holes ·6 in. below the rim. The bowl must have been much deeper than some of this class.

K2 must have been a bowl of the same type (213 226 244 307 312 365 377 388). Its sherds were all found in the disturbed area, so it may have lain in Chamber III. To it may with reasonable certainty be assigned two pieces of plain rounded rim with a slight groove at the top of the neck, with outer surface somewhat polished, ·28 in. thick; several pieces of thick angular shoulder, reddish and slightly polished on the outside, rough on the inside; and two pieces of rather coarse hard ware ·23 in. thick, which may have come from the belly.

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(47) Kendrick & Hawkes, *Archaeology in England and Wales*, fig. 24 4.
(48) Ebert, *Reallexikon der Vorgeschichte*, IV pl. 38k.
(49) Callander, *Proceedings of the Society of Antiquaries of Scotland*, (1928/9) p. 29.

The mixed deposit beside Chambers II and III yielded a number of decorated sherds, but their surfaces and edges are often badly rubbed, and there are seldom more than one or two pieces of each pot. Many fragments cannot be satisfactorily assigned, and we could not be certain how many pots are represented.

L consists of a few sherds (244 268 269 385) from the mixed deposit beside Chamber II. As stated above, the pot had probably lain in Chamber III. The colour is grey inside and reddish outside, the biscuit grey-black and rather gritty. The thickness of the walls averages ·2 in., of the base ·47 in. The base is flat, the walls are rounded off on the inside, and splay slightly on the outside; they rise nearly perpendicularly. The external diameter of the base was about 3·2 in. The rim is rounded, and decorated on top with radial strokes. The vessel is ornamented with vertical strokes in zones, separated by deeply impressed cord-bands, which sometimes cut the striations and were clearly applied subsequently. The pot was probably quite low. Its size, and especially its heavy base, shew that it belonged to that class of bronze-age ware known as incense-cups.

M consists of a few sherds of an almost spherical pot (266 379 387) found in the disturbed area beside Chamber II, and perhaps from Chamber III. The inner surface is reddish and rather rough, the outer grey and smoothed but unpolished; the biscuit is reddish and fairly free of grit. The thickness is ·2 to ·35 in. There is one piece of rounded rim, but nothing survives of the base. The external diameter at the shoulder was about five inches. The upper part of the body to just below the shoulder is decorated with horizontal bands of cord-ornament set irregularly; owing to the poor condition of the surface, these have sometimes run together to make continuous lines. This pot probably also belongs to the bronze age, and is comparable to certain forms of incense-cup.

N is a single hammer-headed rim, probably of a fairly small pot (198), found in the disturbed area of Chamber III. The biscuit and surface are brown-black, the latter smooth and unpolished, the thickness ·35 in. The paste contains a little grit. There is not enough extant to determine the angle of the wall of the pot. On the portion of the body now extant there seems to have been no decoration, the rim is ornamented with diagonal finely incised maggots, not curved as is more usual. This type of decoration is paralleled on the top of a rim from Beacharra,[50] while curved maggots were found at Carrick East,[51] and characterise English neolithic-B ware.[52] The shape of the rim resembles Old Kilpatrick 1, Eilean an Tighe 14 and Ballyalton H.

O. A good number of the sherds of this pot were found in the disturbed earth beside Chambers II and III; it perhaps lay in Chamber III (190 204 206 213 214 239 261 268 270 319 354 355 402). The colour is reddish or brown-black, the paste fine, the walls extremely thin. In all cases where the surface has survived, it is well smoothed and slightly polished; the redder pieces are mainly highly burnished, either inside or outside, but we think that this is due to influences subsequent to the breaking of the pot. The thickness of the rim is ·5 in., of the neck ·1 to ·12 in., of the shoulder ·25 in., of the belly ·15 in. The shape was probably globular, and there are no pieces of flat base. The internal diameter of the rim was about 5·6 in., of the shoulder about 7·2 in. The rim was made of a separate strip of clay applied to the body. The shoulder is angular; on one piece is what must almost certainly be the broken base of a tubular lug. Somewhere on the lower part of the body was a curved relief-ridge;

(50) Callander, *Proceedings of the Society of Antiquaries of Scotland*, (1928/9) p. 29.
(51) *Ulster Journal of Archaeology*, I (1938), p. 98, pot B.
(52) Piggott, *Archaeological Journal*, LXXXVIII (1931), p. 67.

we are inclined to think, though we can find no parallels, that it is drawn upside-down on fig. 3, and that it formed a ring to support the pot on a stand; the walls are curved on both sides of it, so it cannot be the edge of a proper ring-base. The whole surface is ornamented with shallow vertical grooves, arranged so as to converge up to the tubular lug. Our theory about the base-ring is supported by the change in the ornamental scheme below it to a pattern of hatched triangles.

This type of ware is most unusual, and it is difficult to place it in its proper position. Mrs. Hawkes very kindly examined some of the sherds, and writes: "The pottery seems to be a hybrid between Beacharra and Unstan wares, with the form and ornamental *technique* of the former, but the ornamental scheme (alternately hatched triangles, etc.) of the latter." The shape and vertical scorings of the upper part of the body are paralleled on a pot from Beacharra. At Hautes-Bruyères near Villejuif (Paris)[53] was found an undecorated pot with raised circular rib on the neck; but this can hardly correspond to ours. But the most important feature of our pot is the tubular lug. A recent writer regards this as originating in Egyptian stone-bowls, and as being one of the characteristics of that westward and northward spread of sea-borne culture associated with the building of megaliths.[54] Such lugs are common in the Mediterranean, but the only one mentioned from the British Isles was found at the neolithic settlement of Hembury. They are not otherwise known on shouldered pottery, which is supposed usually to have been lifted by a wide strap rather than by a cord. We have already mentioned the close relationship between Clontygora and the horned cairns of Sardinia; it is interesting to find this confirmed by at least one southern element in the pottery, which is otherwise of normal north-western type.

P (369), found in the pit of the missing north-eastern jamb of Chamber II, appears to be a piece of a rough thickened lug, with a decoration of punched dots above and below it. The thinness of the wall above suggests a rim, though the edges of the sherd are so worn that it is impossible to define its shape. The surface is red. A multiple rim of this type would not be unparalleled in Scotch neolithic ware.

Q was found with P and may belong to the same pot, as we have not been able to attribute any rim-shape to it. The surface is red on the outside, blackish on the inside; the biscuit is reddish with little grit. The thickness of the neck is ·2 in., of the shoulder ·35 in., of the belly ·23 in. The shoulder is angular. The diameter is the pot was small, though insufficient survives to determine it. The neck is decorated with deep and somewhat irregular vertical striations, the shoulder with shallow scorings and below with two rows of deep jabs. The pot is not far removed in shape and decoration from Ballyalton F1, and seems to be a development of the shouldered bowl used as a small cup.

Pieces of pot R were found in crannies in the paving of Chamber II, in which the pot must have been deposited. There are a good many coarse fragments, ·35 to ·45 in. thick (81 95 168 183 237 380). The surface varies from black to yellow and reddish, some sherds are sooted on the inside; the biscuit is brown with some pebbles; the pot was fairly smooth but unpolished. There were no pieces of significant shape, one is decorated with parallel lines of cord-ornament. The fabric looks late, and the pot was perhaps a cinerary urn, like F. It is, however, difficult to believe that it antedates the paving of Chamber II, and the sherds found among the stones must have worked their way down by chance.

(53) Ebert, *Reallexikon der Vorgeschichte*, IV pl. 11a.
(54) Peake, *Memoirs and Proceedings of the Manchester Literary and Philosophical Society*, LXXXI (1936/7), p. 37.

STONES.

The Clontygora excavations yielded a fair number of flints, mostly flakes. Some of the finer ones seem derived from the same cores. The majority were, however, struck from flint pebbles up to 2½ in. in diameter. Two such pebbles were found unworked (205 370). Mr. J. J. Hartley of Queen's University informed me that they would occur in the drift, and would be concentrated on the beaches of Carlingford Lough and Narrow Water by river-action denuding the boulder-clay of the interior. They seem to have been an important product of this area, and were perhaps one of the inducements to early men to settle here; the settlers of Co. Antrim were naturally more likely to use nodule-flint, though flint-mines, like those of England and the Continent, have not yet been discovered in Ireland. Nevertheless, a considerable proportion of the Clontygora flints are derived from nodules, an indication of the amount of communication and trade at this time between differents part of the country, as its nearest source must have been near Lisburn. Larger or finer tools would usually be struck from unrolled nodules. It is possible to give statistics of some value from our excavations.(55)

	Nodules.	Pebbles.	Doubtful.
Forecourt	3	? 1	—
Chamber I, neolithic layer	10 (? 11)	12 (? 13)	8
Chamber I, base of black layer, so perhaps neolithic	1	4	—
Chamber I, black layer	1	2	1
Chamber I, disturbed areas ...	2	2	—
Chamber II, in situ	1	2	3
Chamber II-III, from disturbed earth	3 (? 4)	31	11
Total ...	21 (? 23)	53 (? 55)	23

In the neolithic layer of Chamber I we found eight hollow scrapers. 174 is a thin flake of fine flint, struck from a nodule, 2·3 by 1·3 in., and worked into a hollow scraper on one side, ·95 in. wide and ·25 in. deep. 238 is a thin flake of fine flint from a nodule, 1·15 by 1·1 in., with a hollow scraper ·73 in. wide by ·16 in. deep on one edge. 241 is an irregular flake of fine flint from a rolled pebble, 1·4 by 1·67 in., with a rough hollow scraper on one edge, ·9 in. wide and ·18in. deep. 285 is a thin flake, 1·13 by ·9 in., with a shallow scraper on one side, ·6 in. wide and ·13 in. deep. 290 is a thin flake from a nodule, 1·5 by 1·32 in., with a nearly circular scraper on one edge, ·68 in. wide and ·23 in deep. 320 is a flake 1·23 by 1·13 in., made into a scraper with hollow ·73 in. wide and ·17 in. deep. 337 is a thin flake of fine flint from a nodule, 1·4 by ·8 in., with a hollow on one side ·7 in. wide and ·17 in. deep. 348 is the second flake of a rolled pebble, 1·25 by ·9 in., with a flat hollow on one side, ·8 in. wide and ·19 in. deep.

(55) The third column includes those flints on which no cortex remains. The inventory numbers are as follows: Forecourt, nodules 25 36 79 ; pebbles 45 ?. Chamber I neolithic, nodules 174 200 238 281 289 290 293 294 320 337, and 275 ? ; pebbles 75 77 129 241 272 281 289 292 295 324 329 348, and 296 ? ; doubtful 170 215 218 285 297 303 320 350. Chamber I, base of black layer, nodule 341 ; pebbles 43 59 276 (perhaps slightly retouched on one edge) 331. Chamber I black layer, nodule 338 ; pebbles 19 260 ; doubtful 40. Chamber I disturbed areas, nodules 64 139, pebbles 64 and another. Chamber II in situ, nodule 94 ; pebbles 96 234 ; doubtful 97 356 390. Chambers II-III, mixed earth, nodules 213 227 270, and 367 ? ; pebbles 181 182 (twice) 185 192 (four times) 210 213 (seven times) 228 230 243 246 274 299 300 322 330 363 368 (twice) 373 374 395 ; doubtful 190 194 213 (three times) 247 265 278 371 374 392.

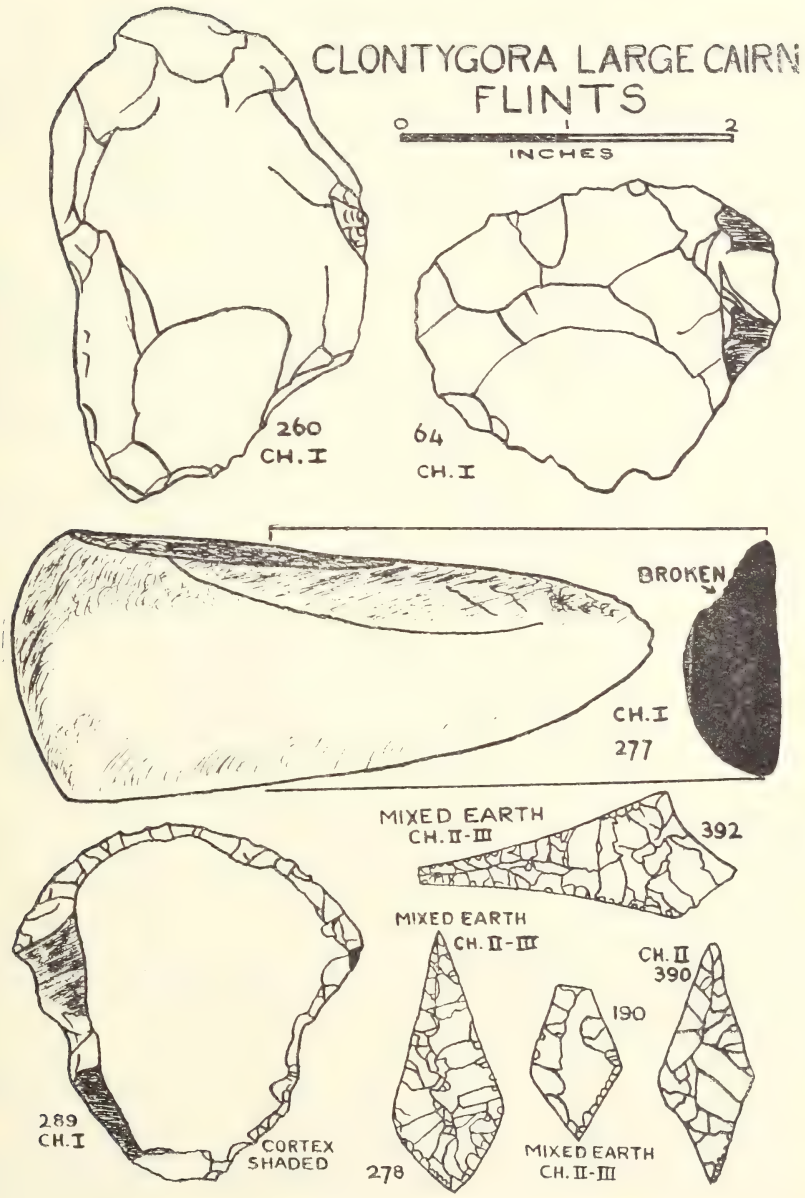
CLONTYGORA LARGE CAIRN
FLINTS
0
1
2
INCHES
260
CH. I
64
CH. I
BROKEN
CH. I
277
MIXED EARTH
CH. II-III
392
MIXED EARTH
CH. II-III
CH. II
390
190
289
CH. I
CORTEX
SHADED
278
MIXED EARTH
CH. II-III

Fig. 4.

In the same layer were four ovoid scrapers. 289 (fig. 4) measures 2·1 by 2·03 by ·26 in. maximum thickness. The bulb is at the butt. The upper side is formed by a flake-surface, the lower mainly so, with a little cortex on one side. It has been retouched with rather coarse flaking round the end and along the upper side. 295 has been struck from a pebble. The bulb is at the butt. The under side is formed of one flake-surface, the upper of several. The tool has been retouched round the end and along part of one side. It measures 1·95 by 1·4 by ·29 in. maximum thickness. 295 measures 1·4 by 1·07 by ·26 in. maximum thickness. The bulb is at the butt. It has been worked round the end with rather coarse flaking. 320 is the exterior flake of a nodule, measuring 1·8 by 1·05 by ·16 in. average thickness.[56] It has been worked roughly round one edge into an ovoid scraper, and later apparently broken longitudinally.

At the base of the black layer in Chamber I we found 341, a small thin flake of fine flint struck from a nodule, 1 by ·84 in., with a shallow hollow on one side, ·67 in. wide and ·12 in. deep. 260 (fig. 4) is a roughly chipped ovoid chopper with slight beak, battered along one edge, and apparently derived from a large rolled pebble, from which a few flakes have been removed. It measures 2·9 by 1·8 by 1·0 in. maximum thickness. 338 is an interior flake of fine flint from a nodule, 1·6 by 1·4 in., with a hollow scraper on one edge, ·65 in. wide and ·21 in. deep.

In the disturbed earth of Chamber I we found 64 (fig. 4), a rough chopper derived from a nodule, measuring 2·2 by 1·8 by ·83 in. maximum thickness. A little cortex remains on it. The lower side is fairly flat, the upper rises to a central ridge. The flakes seem to have been taken off from the edge.

390 (fig. 4) is a roughly chipped and irregular leaf-shaped arrow of fine flint, found in situ on the floor of Chamber II. It measures 1·41 by ·58 by ·15 in. maximum thickness along the medium ridge. Both faces are chipped.

In the disturbed earth of Chambers II-III we found three leaf-shaped arrowheads. 190 is a finely worked specimen of transparent flint, broken towards the point, and now measuring ·9 by ·55 by ·1 in. maximum thickness. The broken end is the thicker, and the bulb may have been close to the point. The underside is a flake-surface with a little lateral retouching, the upper consists partly of a flake-surface, partly of a number of fair-sized flakes. 278 (fig. 4) is a finely chipped arrowhead of opaque flint. On both surfaces fair-sized flakes have been taken off from the median rib, with additional lateral retouching. It measures 1·53 by ·64 by ·12 in. maximum thickness. 392 (fig. 4) is a very finely worked and slender example, broken at the point and on one side of the butt, now measuring 1·85 by ·73 maximum width by ·15 in. maximum thickness, near the centre. The under side is a flake-surface with a little lateral chipping, the upper is delicately chipped all over.

In the same deposit we found two other shaped flints. 183 is a curved flake, struck from an irregular core. The outer edge seems to have been roughly worked into a convex scraper 2·2 in. across, describing an arc of a quarter-circle. 270 is a rough chopper measuring 1·95 by 1·8 by ·8 in. maximum thickness. The lower side is a flake-surface, the upper rises to a median ridge, so that one face seems more patinated than the other, as if the object had been made from an older tool. Along one edge is a little battered cortex, so the flint may originally have been a hammer-stone.

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(56) The maximum thickness is ·37 in., owing to a lump in the cortex which has not been removed.

Three other stones from the excavations deserve mention. 9, from the black layer in Chamber I, is a rolled pebble of white quartz, such as are not infrequently found in megaliths, and are believed often to have been intentionally deposited. 312, from the mixed earth in Chambers II-III, is a broken crystal of very white translucent quartz. 277 (fig. 4), from the top of the neolithic layer in Chamber I, is an irregular epidiorite axe of shoe-last form. It is polished, and in one place partly facetted to conceal a flaw in the stone. The butt is pointed and slightly broken, as if it had been used for hammering. The blade is well preserved and fairly sharp, though somewhat asymmetrical and angular on one side. The under-surface is flat save for a slight bulge near the butt. The length is 3·9 in., the width at the base of the blade 1·6 in , the maximum thickness ·58 in.

Animal-bones.

The animal-bones have been most kindly examined by Miss D. Bate of the South Kensington Museum. Their find-spots have been mentioned in the body of the text. None were found in the undisturbed neolithic layers. Those from Chamber II all came from the mixed earth. In Chamber I the lowest piece was 80, sheep or goat, from near the base of the black. Equus was found only in the top-layer and at the disturbed side of the chamber.

Miss Bates writes as follows:—" With the exception of a few fragments of shells, including part of a Limpet-shell,[57] the collection consists of limb-bones and teeth of two species of mammals. These are Horse, and Sheep or Goat, the former being represented by the larger number of specimens.

Little information is provided by the remains of Sheep or Goat, since these are mainly isolated chalk-teeth.

The Horse-remains include several complete limb-bones, which shew it to have belonged to a race of small size, perhaps about the size of a Connemara pony. One of the specimens is a complete metacarpus of a sub-adult animal, and this bone has a maximum length of 225 mms. In the comparative table of measurements given by Dr. Scharff,[58] this bone in a recent Connemara pony (male) has a length of 230 mms.

All the Horse-bones are those of young or sub-adult animals, and only milk-teeth are represented, some of these being in a very early stage of development. This may suggest the possibility of these animals having been used for food."

The human bones have been most kindly examined by Prof. T. Walmsley of Queen's University, Belfast, who reports as follows:—" The specimens from the yellow-brown layer in Chamber I[59] contain much earth and gravel, fragments of wood charcoal, and scraps of incinerated adult human bones. The latter are much broken, very soft and friable, and it is not possible to do more than recognise them as parts of an adult human skeleton. I can find no evidence for more than one skeleton.

" 157, from the base of the black layer, is merely charred. There is nothing comparable to it among the other bones. I consider it to be human bone, and probably a piece of the humerus. It must therefore represent a

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(57) Patella Vulgata, no. 356, from the mixed earth of Chambers II-III.

(59) *Proceedings of the Royal Irish Academy*, (1909) p. 86.

(59) From the yellow-brown 86 90 162 171 175 187 254 ; from the base of the black layer 46 166.

separate and very incomplete incineration." It may be connected with the late bronze-age pottery from this layer, though it is strange that more of the body was not found.

" 6, from the burnt layer, is part of the linea aspera region of the femur probably of a male, and has been well burnt. It is stained in a way that I cannot explain." This is the only human bone found at this level, and one might expect it to be intrusive, though we can suggest no source for it.

" The specimens from Chambers II-III[60] contain small fragments of incinerated adult human bone. Some are much softer than others, but they are less soft or friable than the pieces from Chamber I. I am unable to say with certainty whether more than one skeleton is represented, but I am of opinion that there is only one."

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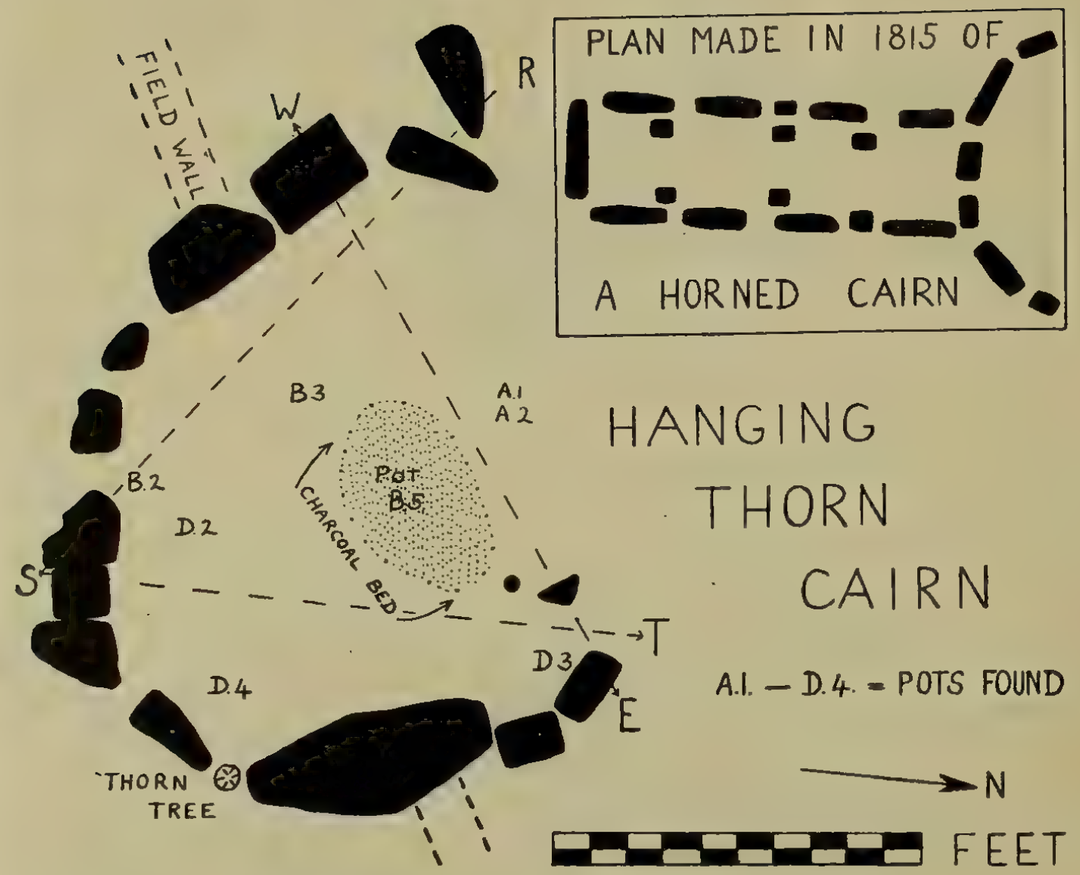
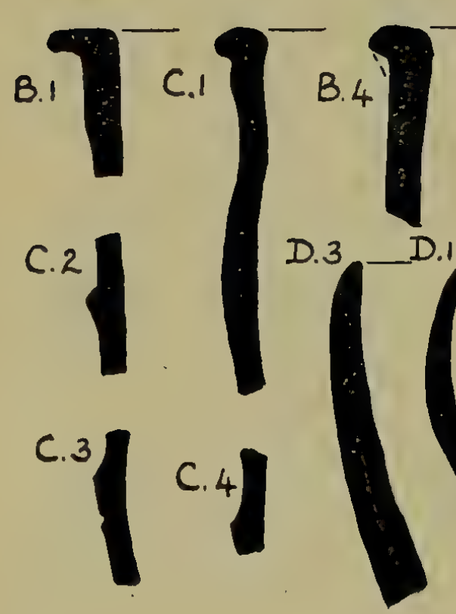
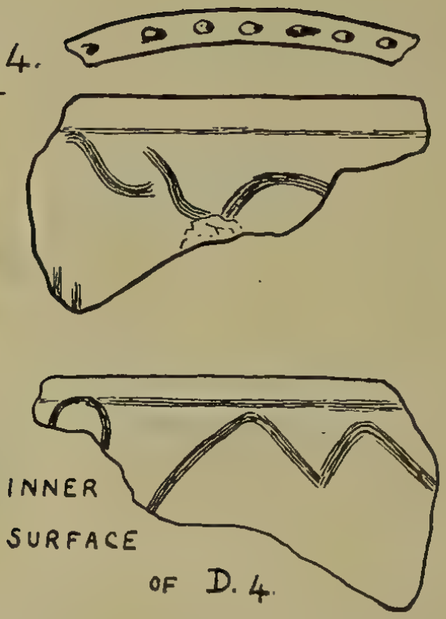
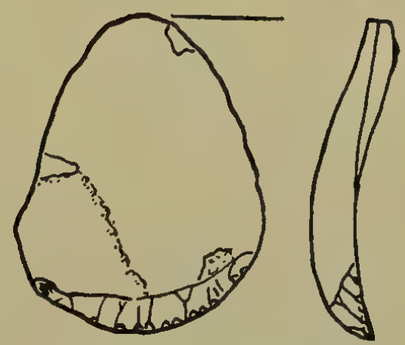
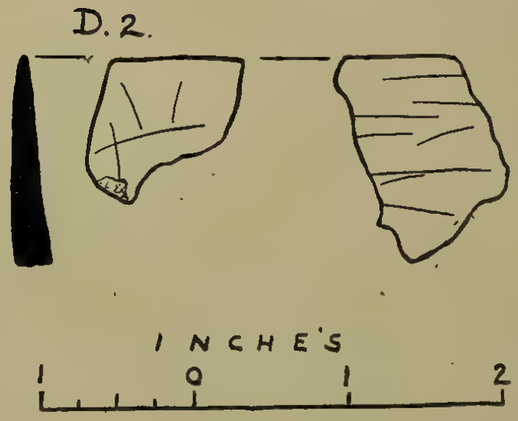
(60) From the undisturbed yellow layer in Chamber II, 23 31 81 95 98 127 154 189 372, see above pp. 29, 30, nn. 38, 39. From the disturbed area 263 359 381 387 399, see above p. 30. n. 40.







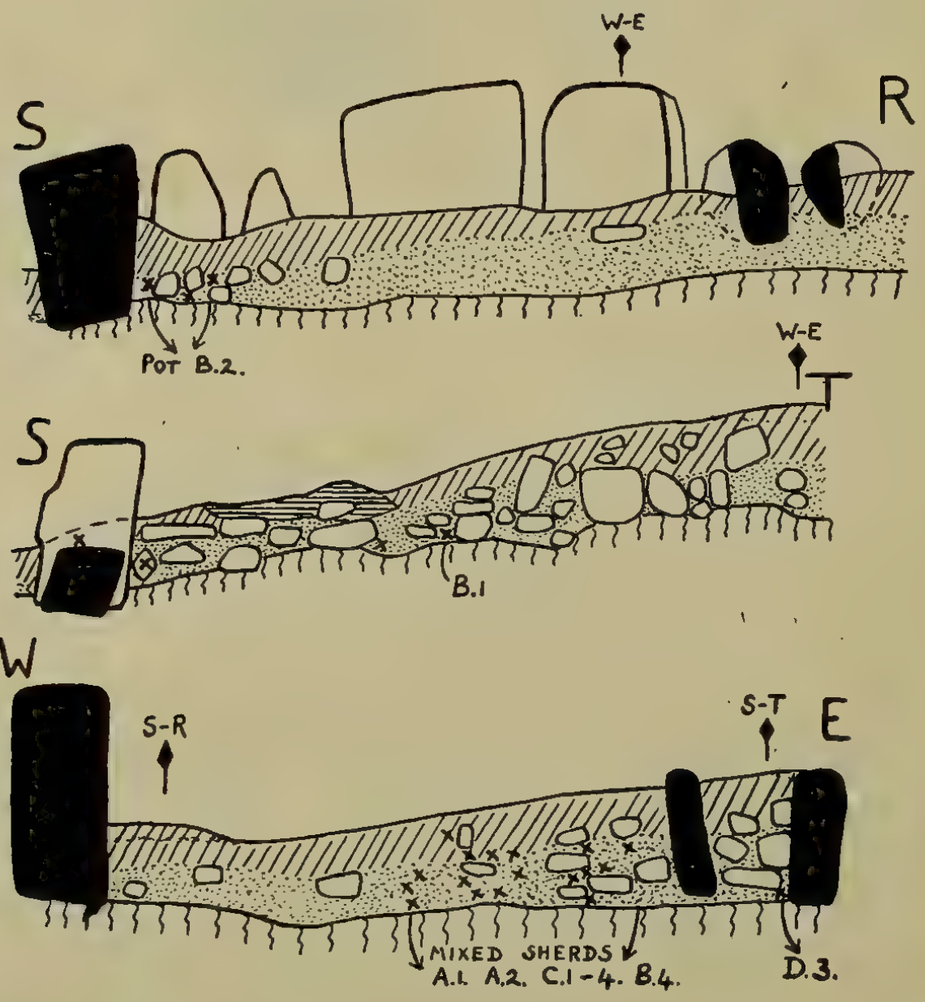


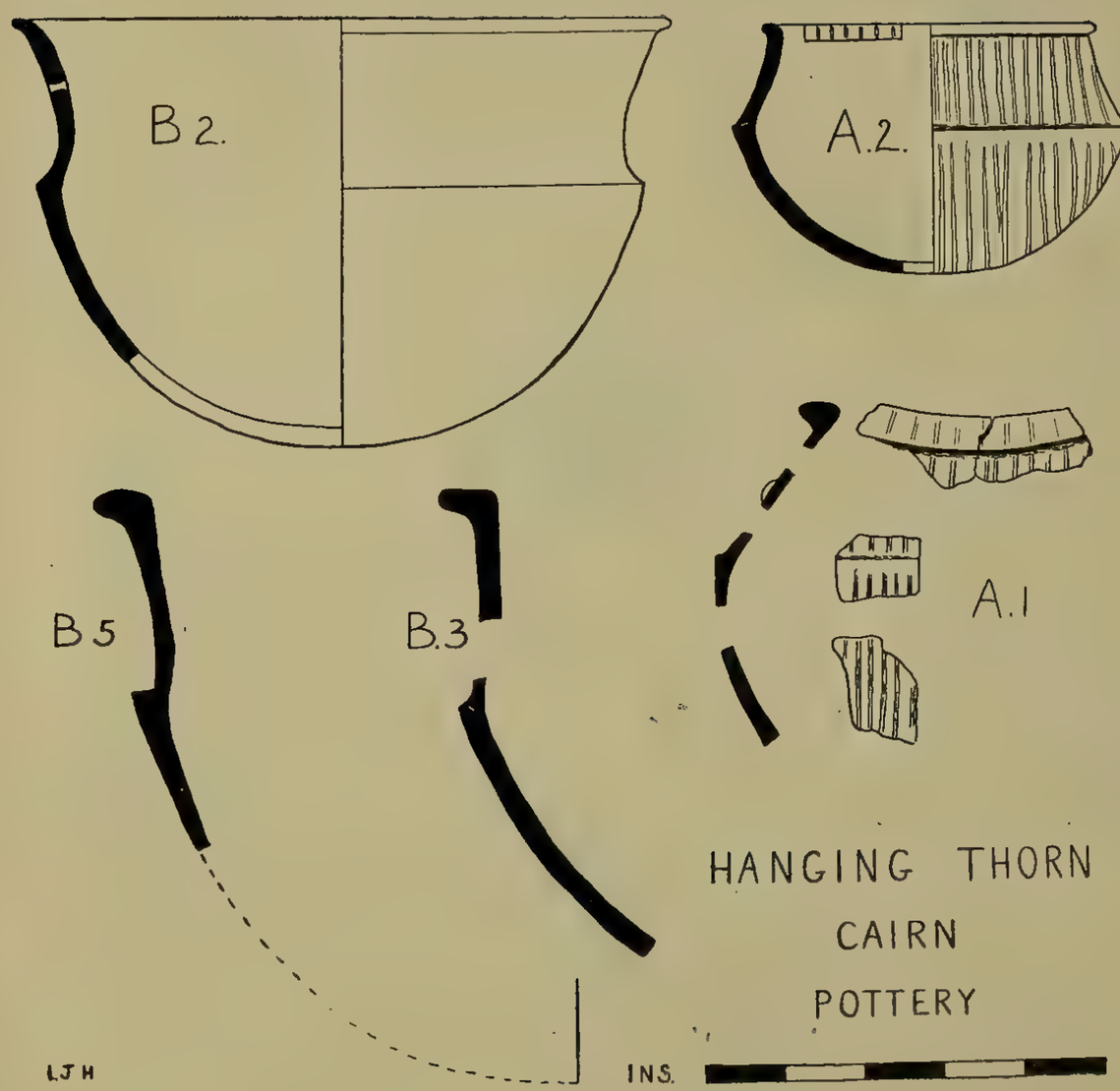


Hanging Thorn Cairn. Finds.

HANGING THORN – SECTIONS

BROWN EARTH
YELLOW EARTH
BLACK PEATY LAYER
TILL
x ..... SHERDS
0 5 10 FEET





THE FORECOURT, HANGING THORN CAIRN, M'ILWHAN'S HILL, BALLYUTOAG, LIGONIEL.

By I. J. Herring, M.A.

This small excavation was undertaken on behalf of the Belfast Natural History and Philosophical Society by the writer, and the work was carried out during Coronation Week, 1937, and subsequent week-ends. The situation, some four miles from the centre of Belfast, enabled the excavator to dispense with hired labour, and the bulk of the work was done by boys from the Scout Troop of the Royal Belfast Academical Institution (Unwin, Glenn, Russell, Kerr, Sellar, Swinson, Crowe, Hunter, together with a non-Scout, Duffin). Mrs. Ivor Herring and Messrs. Angus M'Donald, T. Chalmers (B.B.C.), and J. Cowan (R.B.A.I.) completed the party. The excavator was exceptionally pleased with the Scouts, and wishes to record that his only grumble was that it was difficult to get them to stop work. The excavation was visited by Miss M. Gaffikin, Professor Gordon Childe, Mr. Estyn Evans and Mr. T. Greaves.

Situation of the Cairn.

The cairn stands half-way up the south-eastern slope of M'Ilwhan's Hill, one of the subordinate members of the Divis range at the back of Belfast. It is in the townland of Ballyutoag, and is on the land of Mr. James Farlow, who readily gave permission for the excavation. The site is approximately on the 950′ contour. It is easily reached by taking the road to the right 1¼ miles along the Crumlin Road from the Horseshoe Bend. Soon after crossing the trickle of the Ballymartin Water at the Flush, you may see the cairn forming part of the uppermost field wall on the hillside to the left of the road. It is 50 yards from the road.

The Nature of the Cairn.

The forecourt alone remains, a three-quarter circle of standing stones. The existence of burial chambers, now destroyed, is suggested by two portal stones separated by a sill stone, and by several large blocks of the type used for side walling lying about the field just below the cairn. The monument was obviously once a horned cairn, and our examination was designed to find scraps of evidence to add to the body of knowledge collected by Messrs. Davies and Evans at the horned cairns of Goward, Ballyalton and Browndod. We did not expect much, having only the forecourt to examine, and having been requested to confine our digging to the area bounded by the horns. As it was, we were allowed to assure ourselves that the large blocks in the field below were quite loose, no more than turf deep, and to skim the area immediately at the back of the portals where no trace of the location of chamber side-walls could be found. The ridges of old "lazy beds" in the lower field showed that spade cultivation had destroyed the evidence of the rest of the monument. Therefore, by clearing the whole of the forecourt we collected all the evidence about the cairn which Time had left, with the exception of what might have appeared from trenching across the cattle path which ran a few feet from the outside horn stones. Such a trench might have given us the frontal limit of the enclosing cairn as the upper field had not been cultivated. With so little of the cairn left, we were, however, very fortunate to discover a considerable amount of pottery, much of it restorable, in positions suggesting original deposition and not throw-outs from the chambers.

To assist the reader unacquainted with the appearance of a horned cairn, we have given, as an inset to the plan of what remains of Hanging Thorn Cairn, a copy of an old drawing, somewhat simplified maybe, of the Annaghclochmuilinn Horned Cairn (now destroyed). That shows clearly the essentials of this type of grave, with the horns and four chambers. At Hanging Thorn Cairn only the horns remain.

The district in which the cairn is situated is of considerable interest. Mr. Oliver Davies has suggested that Belfast Lough formed a convenient point of entry for the horned cairn builders as the high ground flanking it provided dwelling sites above the damp forest of the valleys and within a mile or two of the shore.[1] They were also usefully placed for the flint bearing chalk revealed underneath the basalt caps of these hills. Hanging Thorn Cairn is just over a mile from the site on Squire's Hill which has revealed Neolithic pottery, two miles from the megalith on Boghill, and four miles from Carngraney and Lyle Hill.[2] It is in a rich prehistoric area.

Traditions connected with the Site.

The Scouts who camped by the cairn were constantly questioned as to our success in finding gold. We therefore quote a description by one of them (Swinson) of the stories which local opinion so persistently linked with the cairn. They explain also why the monument is dubbed Hanging Thorn Cairn.

> " We heard many queer stories from the farmers in the evenings after the excavators had returned to town. There was the Hanging Thorn growing between two stones of the cairn: in 1798 a man was hanged from it. We were told about Nishy Hogan, a noted highwayman who lived in the district. According to a lot of people, he ' collected ' a lot of gold which he buried. The only clue he left was ' Stand where ye can see five loughs, take eleven strides and there the gold is buried.' This is very awkward, for, even if you find a hill near Belfast from which you can see five loughs, you still have to take eleven paces. And Hogan, being chased by dragoons from Carrickfergus, leapt the mouth of the Lagan. Said a farmer on the other side: ' That was a quare lep, Nishy! ' So quare too must have been Nishy's paces. Another story was that a road once passed along the valley, and, in a hollow below the present Rifle Range, a donkey skin full of gold was buried. The hollow is called the Pedlar's Grave."[3]

The Excavation.

The whole area between the horns was excavated. Sections from the portal to the end of each horn were taken (S-R, S-T). and a third across the forecourt (W-E). Then the triangular space between these was dug in two foot trenches. When the whole area had been dug, re-covered and re-turfed, we re-erected the wall which had run across the forecourt, but this time abutting the end horn stones. The forecourt is now more impressive without its bisecting wall.

The first three sections were completed in Coronation Week, but the central triangle was excavated and the wall or semi-wall rebuilt by Mr. J. Cowan and the writer as week-end exercise.

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1. U.J.A., Series III, Vol. 1, p. 120.
2. Op. cit. p. 2.
3. R.B.A.I. School News, Vol. 45, No. 146, p. 44.

The horns, composed of erect basalt slabs, face uphill in a north-westerly direction.[4] They form an irregular three-quarter circle, uneven in height, and varying greatly as to the magnitude of the stones. The east horn, including the east portal stone, contains five stones, the west has six. The total of eleven stones may be compared with the eleven of Goward and the thirteen of Browndod. For convenience we are referring to the west horn stones as W.1-6 (W.1 being the west portal) and to the east horn stones as E.1-5.

The portal stones E.1 and W.1 are two solid blocks, 4′ 4″ x 2′ 7″ x 1′ 6″ and 3′ 10″ x 2′ x 2′ 2″ respectively, and they are separated by a sill stone which is approximately 1′ 6″ square. The portal stones lean towards one another slightly, being 1′ 4″ apart at the top and 1′ 8″ at their bases. All three stones sink about six inches into the till. W.2 and 3 are rather meagre stones, but W.4 (4′ 9″ x 3′ 9″ x 2′ 10″) and W.5 (4′ 6″ x 2′ 11″ x 2′ 6″) are impressive blocks, fit counterparts for their single vis-a-vis, E.3 (6′ 3″ x 6′ 9″ x 2′ 7″) which is partly overshadowed by the branches of the Hanging Thorn. By contrast E.4 and E.5 are insignificant uprights, 3′ 3″ and 2′ 10″ in height respectively, the latter being completely hidden by turf before we began work. They are balanced at the end of the western horn by W.6 which, although we could not detect a depression in the till, we suggest to have slipped from an upright position against W.5. It is 3′ 1″ in length.

The horn stones sink only slightly into the till with the exception of the massive E.3, the weight of which presses it 1′ 3″ into the till.

Next to W.6, a stone 3′ 2″ in length lies on its side pointing west. This may be the first stone of a peristalith, the rest of which has been incorporated into the field wall.

It may be suggested from the setting of the portal stones and sill that this cairn originally paralleled Goward and Browndod in the tilt of forecourt to chambers, and that, like Browndod, the axis through chambers and portals would have run close to the extreme end of the left horn (assuming an observer in the forecourt facing the chambers). It is interesting to note that 1′ 10″ from E.5 we discovered a slender upright column, 2′ 9″ in height (shown on section W-E.) which is approximately on a line drawn through the centre of the sill and parallel to the inner faces of the two portal stones. It is not set in till, but well into the layer of yellow earth and boulders which the cairn builders deposited in the forecourt. Its base is only 3″ from the till. It may be noted that both Browndod and Ballyalton had " pointer stones " in the forecourt: the former roughly in mid-forecourt, a stone 5′ long; the latter well outside the confines of the horns, an isolated upright 7′ long.[5] Our small pointer stone cannot compare with these in size, but it may have been similar in function.

The area enclosed by the horns has a greatest width, section W-E., of 14′ 6″; a greatest depth of 13′. In addition to removing the ruined wall running between W.4 and E.3, we had to uproot a few whin bushes. When we had done this preliminary clearing, we could see that the forecourt sloped from the portals up to the pointer stone, but in the western sector was more level. The humus and brown earth was of varying depths, deepest in the area adjacent to W.1-3. Underneath the Hanging Thorn the top layer was a black peaty looking earth doubtless caused by leaf decay and slow drainage. In this we found black

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4. On the hillside above the cairn are circular wall foundations within rectangular enclosures.

5. B.N.H.P.S., 1933-4, p. 81, and 1934-5, p. 81.

decorated sherds of an Iron Age pot, D.4, the relics of people who found the stones of the forecourt a convenient shelter.

Underneath this upper layer, whether brown or black, came a layer of yellow loam, extending right down to the till. In the eastern half of the forecourt, this was co-extensive with a tightly packed mass of stones, providing hard work for the excavators (see section S-T). This thinned out in the western half and became almost non-existent in the section S-R, where the trowel work, as a result, was rapid. This contrast may be due to digging for material for the field wall. Whatever the cause, the western sector had been disturbed, and apart from the flint scraper from the foot of W.4 and the pot B.2 underneath a little remaining cairn against the base of W.1 and W.2, we found nothing in the area between section S-R and the west horn.

This yellow layer contained many scraps of charcoal, identified by Mr. M. Y. Orr, of the Royal Botanic Gardens, Edinburgh, as hazel and birch.[6] In the disturbed western sector the charcoal appeared as smears in the yellow which Mr. Common suggested was due to conditions of greater filtration promoting disintegration of the burned wood fragments. Specimens of yellow earth from this sector revealed under the microscope tiny fragments of charcoal invisible to the naked eye.

In mid-forecourt a continuous bed of charcoal, covering an area roughly 6′ x 3′ was discovered. It rested on the till, and was about two inches thick. On it rested fragments of the Neolithic pot B.5. A charcoal layer with sherds was also discovered in the forecourt of Goward.[7]

Most of the pottery discovered was resting on the till or in the bottom layer of the yellow earth. It was thus in its original position as deposited by the cairn builders before the stone bed was laid down. An exception was D.2, a simple bowl ornamented with scorings, which was found in the top layer of the yellow bed. In addition the cross section W-E presented us with scattered sherds of the rest of the decorated pottery. This scattering may also have been due to disturbance as the area immediately to the west of the pointer stone was very loose.

The location of B.2 and D.3 were interesting, right against the base of the hornstones, W.1 and 2, and E.5 respectively.

THE FINDS.

Iron Age Pot. D.4. Found underneath the Hanging Thorn. This has a black surface, with an even blacker interior. It has very little grit. The baking was very firm. The rim sherds present a concave exterior profile. The sherds narrow to the rim which is flattened and ornamented with punch marks about ·18″ apart (cf. sherds from the Boat Cave near Ballintoy[8]). The pot is decorated both on the outside and on the inside of the rim sherds with a vague curvilinear (at times almost a chevron) design. A damaged sherd suggesting a flat base also showed wavy decoration. The curve of the rim suggests a diameter of about 6½″. Professor Childe saw these sherds and reported:—" The nasty sherds you send me do not remind me of any Neolithic or Bronze Age wares that I have seen in Ulster. The flat rim with its indentations vaguely recall the ' Iron Age ' wares of Antrim coastal sites (Ballintoy), remembering that, in the light of the Fairhead excavation just completed, ' Iron Age ' may mean

6. Hazel and birch also came from the black layer with the " Iron Age " pot.
7. B.N.H.P.S., 1932-3, Plate 4.
8. I.N.J., Vol. 6, p. 38.

anything up to 1300 A.D. at least ! On the inside there is tooled a rather vague wavy line. A wavy line inside the rim in a different technique decorated a pot found on the ' Castle Mound ' of Doonmore, Fairhead, and is, C. G. Dunning tells me, appropriate to early Norman wares.''

Neolithic Pottery.

A.1. A pot of Beacharra type. The sherds have a smooth light red surface and have a little white grit as backing to the clay. The walls of the upper part of the pot are very thin, being only 4 to 5 mm. in thickness. The rim ledge seems to have been applied after the wall of the pot had been built up. All the sherds discovered, including those belonging to the ledge, are ornamented with vertical fluting. The grooves of this fluting are about 4 mm. apart. The decoration does not continue over the point of the rather delicate shoulder, but begins again 4 mm. below it. One tiny sherd seems to have a vestigial lug, 7 mm. in diameter and standing out 2 mm. from the wall. The decoration does not extend over this lug.[9] Another puzzling sherd had a smooth inturning at the vertical edges almost suggesting, says Mr. Stuart Piggott, a perforation of fairly large diameter carefully made before firing.

(This sherd is not illustrated.)

The rim diameter of this pot seems to be about $7\frac{1}{2}''$. A parallel to it is the bowl from Largie, which has the same bold rim, well defined shoulder, and vertical fluting.[10] Mr. Piggott refers me also to the sherd with shallow vertical grooves from Mull Hill, Isle of Man.[11]

A.2. Also Beacharra in type, this pot was found in association with A.1. The ornamented ledge shoulder for some time led us to assume that these sherds belonged to two pots of similar ware and decoration. A tiny join between the ledge of the shoulder, which we had assumed to be a damaged rim, and a collar sherd revealed, however, a pot of Piggott's H-J type. The rim is slightly rolled (the moulding is not uniform) and is decorated by slightly oblique grooves. These are continued as vertical ornament down the slightly concave collar, across the shoulder ledge and for about $1\frac{1}{2}''$ below the shoulder. The instrument used to decorate the bowl was probably a piece of bone the point of which was 2 mm. wide. The point was not smooth, for, as it pressed down the clay into a very shallow groove, it left a scored indentation. From the sherds which we can fit together, we deduce an attractive light red bowl, just over 3″ high, 4″ wide at rim, and $5\frac{1}{2}''$ at the shoulder. From the regularity of the break, it seems that the potter built up the bowl in two parts, adding the neck after the lower half had been shaped and the shoulder ledge smoothed down. The ware is not well baked, is backed by considerable white grit, and is rather thin. It seems reasonable to think that this and A.1, which is also fashioned on rather slender lines, represent sepulchral or votive pottery, despite its position on the disturbed fringe of the forecourt. That the ware was not meant for ordinary use is shown by the fact that little attempt was made to thicken off the walls at the place of strain, the shoulder. Nor would the base of A.2 stand domestic turmoil: it is the thinnest part of the pot (4 mm.).

B.1. Two buff sherds with unpolished surface. The clay has a little grit mixture. The sherds form a nearly straight wall, slightly convex on the outside.

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9. See Pot A.3, Ballyalton.
10. P.S.A.S., XXXVI, p. 135, Fig. 51.
11. Antiq. Jour., XII, 153, Fig. 6 (3).

The possible shape of the pot cannot therefore be estimated. The flattened ledge of the rim is akin to that of A.2, Ballyalton, though the latter had ripple ornament. The average thickness of the two sherds is 5 mm.

B.2. This pot has been restored. It came from the base of W.1 and 2. It is a slate coloured pot of very hard ware. It measures 8·3″ across the rim, 7·5″ at the shoulder which comes 2″ below the rim, and stands 5·4″ high. It may be compared with A.2 of Browndod and Pot F of Ballyedmond.[12] The gracefully concave neck of our B.2 has a half rolled rim, 1″ beneath which a small suspension hole was made after the pot had been fired. Suspension holes made after firing were found at Dunloy and Lyle's Hill.[13]

B.3. This is a very hard ware, well polished, and varying from light red to slate in colour. There is occasional large grit mixture in the clay. There is a suggestion of ripple ornament on the rim, which, Mr. Evans tells me, is a common feature of the pots on Lyle's Hill a few miles away. The rim is flat and ·7″ across. The almost vertical wall of the upper part of the neck is ·3″ thick, decreasing to ·15″ approaching the shoulder. Neck and shoulder seem to have been made separately. The lower part of the bowl averages ·25″ in thickness. The pot was obviously a very large one.

B.4. Four scattered sherds from the cross section W-E. They are black and sooty looking, with buff paste poorly baked and with occasional grit. The rolled rim is uneven, the variant moulding being shown dotted in the illustration.

B.5. A large bowl akin to B.2, but with a more massive rim and a more pronounced ledge shoulder, which comes 2·5″ below the top of the pot. The upper surface of the rim varies between ·7″ and ·8″ across. A somewhat concave neck was applied to the shoulder which projects in a horizontal ledge ·3″ beyond the wall of the pot. The potter seems also to have made the neck in two parts, as shown dotted in the illustration. The pot was a large one with a 12″ rim diameter, a 11·2″ shoulder diameter, and a probable depth of 7½″. Though we found practically all the rim and shoulder, we could discover no joins to carry the profile more than 2·1″ below the shoulder. In colour the pot varies from light red to buff to black in even graduations of tone. The paste is dark and hard. This combination of heavy rim and clean cut horizontal ledge shoulder finds no parallel among the pots of the other Ulster horned cairns.

C.1. Five light red well polished and hard sherds from the section W-E. The average thickness of the sherds is ·2″. The rim is somewhat unevenly rolled over. The rather curly profile of the pot leaves us undecided as to the eventful shape of the complete pot.

C. 2, 3, 4. Three fragile shoulders which in texture might all belong to C.1. They are barely more than ·1″ thick. C.3 has a horizontal groove immediately below the shoulder.

D.1. A small irregular pot of Piggott's shape C. It is crudely made, its rim far from circular, its paste crumbly, its surface thumb pressed. It is buff coloured. As far as we can judge from its shapeless rim sherds, the pot was about 3″ diameter.

D.2. Another small plain bowl with simple rim from the top layer of the yellow bed. It is hard and gritless, and varies in colour from buff to black. It has scored lines on its surface.

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12. U.J.A., Series III, Vol. 1, p. 56 and Fig. 3.
13. Op. cit. p. 70 and Note.

D.3. From the base of E.5, this pot is almost identical with D.1 in texture and general profile. It is, however, a bigger bowl. At Dunloy Mr. Evans found a selection of simple rims (G.1, 2, 3 and 6) comparable with our D.1, 2, 3 in profile.

Flint Scraper. We found only one flint implement in the forecourt of Hanging Thorn Cairn. It is an end scraper which had been flaked at one end only. It still retains most of the original cortex.

The pottery thus revealed is exceptionally interesting, and shows how much profit can be derived from the excavation of ruined cairns. We have not only variants of the shouldered pots which seem to be the greatest characteristic of the Ulster horned cairns, but also bowls of the simplest undecorated type, and two pots A.1 and A.2 which, with Pot E of Dunloy and the shallow grooved pottery from Larne,[14] link up with the Beacharra pottery of S.W. Scotland.

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14. P.P.S. East Anglia, Vol. VII, Pt. 1, p. 62.

ANNUAL MEETING OF SOCIETY.

The Annual Meeting of the Society was held on the 27th October, 1937, in the Old Museum Buildings, College Square North, when Mr. R. S. Lepper, M.A., LL.M., President, occupied the chair. Among those present were Dr. S. W. Allworthy, Colonel Berry, Rt. Hon. S. Cunningham, Messrs. W. B. Burrowes (Hon. Treasurer), W. M. Crawford, Oliver Davies, Alex. Davison, E. J. Elliott, Godfrey Ferguson, Professor Flynn, Miss Gaffikin, J. W. Gillmour, F. Adens Heron, Professor W. B. Morton, Joseph Skillen, Captain Turner, Professor Gregg Wilson and A. Deane (Hon. Secretary).

The Hon. Secretary intimated that the annual meeting had been advertised in the local papers, and read the Council's notice sent to each Shareholder and Member.

The Chairman called upon the Hon. Secretary to read the Council's report as follows:—

ANNUAL REPORT, 1936-37.

In accordance with the constitution of the Society your Council is called upon to submit to the Shareholders and Members its Annual Report of the work during the year ending on the 31st of this month.

The year has been one of activity and progress in various directions, in so far as was compatible with the need for husbanding the Society's finances.

Lectures.

Seven lectures were delivered, which dealt with a great variety of subjects; and as in the previous year were of a remarkably high standard, often being based on original research by the lecturer. In spite of very bad weather they were generally well attended and always much appreciated, while the discussions were lively and interesting. Several lectures were of exceptional brilliance such as those of Professors R. M. Henry, Waterhouse and Ruggles Gates, while Mrs. Lorimer's on " Life in the Karakorum Mountains " and that of Professor Starkie of Trinity College, Dublin, on the " Gypsies of Spain " were delightful and admirably illustrated.

Visit.

A party of members, accompanied by the President, paid a memorable visit to the Linen Research Institute in May last, and were courteously conducted through the different departments by the Director, Dr. W. H. Gibson, and members of the Staff, who described most lucidly the various activities of the Institute. The members of the Society had thus a fine opportunity of seeing the valuable work carried on under the ægis of the Linen Industry Research Association. The members were afterwards hospitably entertained to tea by the kind invitation of the Council of the Association.

Your Council desires to express its warmest thanks to all those who have helped to make the session so successful, by giving so generously of their time, their abilities, and their hospitality.

Archaeological Section.

During the year the Archæological Section has played its part in the general increase of archæological activity in Northern Ireland. Rather more than a dozen excavations and explorations have been carried out, of which five have been under the auspices of the Society; a very creditable achievement. Three of these pieces of work have been on prehistoric monuments, the large cairn at Clontygora (Co. Armagh) which is one of the finest horned cairns in Ulster; the small though interesting horned cairn on McIlwhan's Hill near Belfast, and the Giant's Grave at Kilhoyle (Co. Derry). The excavation of the first mentioned cairn was carried out by the Chairman of the Section, Mr. Oliver Davies, the other two by Mr. Ivor Herring. The Section also completed the work of examining the ruins of the XV. century abbey of Corick (Tyrone) and restoring the east window. Finally, it made a liberal grant towards Mr. Davies' excavations at the castle of Island MacHugh, Baronscourt (Tyrone), which have not yet been completed, but have yielded such an important stratified series of remains that this " dig " may be regarded as one of the most important ever carried out by the Society.

The Council is glad to note the continued success of the work done by the Section, and that it has found so good a use for some of its accumulated credit balance with the Society.

Society's Representatives on Committees.

Mr. W. M. Crawford, the Rt. Hon. Samuel Cunningham and Dr. Hunter continued to represent your Society on the local Committee of the National Trust for Places of Historic Interest and Natural Beauty; Mr. E. E. Evans is your representative on the Ancient Monuments Advisory Council, and Mr. E. J. Elliott on the Libraries, Museums and Art Committee of the Belfest Corporation.

Proceedings.

Your Council, having decided to increase the size of the format of the Proceedings, has issued Part I. of the first volume of the second series, which your Council feels is now more suitable in size for the publication of scientific plans, sections and diagrams. It contains some important papers of scientific, historical and archæological interest.

Exchange of Publications.

Your Hon. Librarian (Mr. W. M. Crawford) reports that the practical work of the Library goes on as usual, distribution being made between the Museum Library and the University Library of the Transactions and Proceedings received from exchanging Societies. Also satisfactory progress has been made with the work of binding completed volumes in the Museum Library.

A most interesting addition to the Exchange list is the Devon Archæological Exploration Society of whose Proceedings the whole of Volume I., a magnificent production, has been received. The number of first class Archæological publications received in the Library has largely increased in recent years, and your Council is glad to report that increased use is being made of the Museum Library by members.

Council Members.

Five members of Council retire in accordance with the Society's constitution, having served for three years. They are as follows:—Dr. S. W. Allworthy, Messrs. W. M. Crawford, A. Deane, Godfrey Ferguson and R. A. Mitchell. Your Council regrets that Mr. Mitchell does not seek re-election. The remaining four are eligible and offer themselves for re-election. The meeting will be asked to elect five shareholders or members on the Council.

The Building.

Your Agents, Messrs. A. H. Davison & Dickey, report that the building has remained fully occupied by suitable tenants during the past year. The premises are in good order and condition except for exterior decoration, which the Council proposes to carry out at an early date. The nightly lettings of the Lecture Hall were not so good as could be wished. Apart from the competition of other Halls and Cafés, the demand for such halls seems to have slackened latterly in Belfast, probably through the increasing interest in music, the drama, cinemas and wireless.

Shareholders and Members.

The number of Shareholders and Members remains the same as in the previous session, namely 203. Your Council would like to see the membership increased during the coming year. Reference was made by a member at last year's meeting to the importance of bringing younger people into the Society. Your Council appeals therefore to all to do their best to enrol suitable new members so that the Society's work may be continued and developed with even greater vigour and success. With a larger net income much more could be done by and for the Society. There have been no transfers of shares during the year.

Obituary.

Your Council regrets to record the recent deaths of Professor W. St. Clair Symmers, President of the Society for the years 1915-1919, and of Mr. A. G. Cromie, who frequently attended the General Meetings of the Society.

Financial Statement.

Mr. W. B. Burrowes will place before you a statement of receipt and expenditure for the year to close on the 31st of this month.

Museums Association.

Your Council has heard with pleasure that the Museums Association Conference will be held in Belfast the first week in July next.

Our Society were the pioneers of the Museum movement in Belfast, and it is pleasant to recall the remarks made by the late Professor Edward Forbes—who was regarded at the time as one of the leading British Naturalists—when lecturing in London in 1853 on the Educational Uses of Museums. "In the Belfast Museum," Professor Forbes said, "the eminent naturalists and antiquaries who have given celebrity to their town have made its contents at a glance explanatory of the geology, zoology, botany and ancient history of the locality and neighbouring province." These remarks made only a few months after the first Belfast meeting

of the British Association testify to the admirable work which was being done by members of the Society at the time; and while the Society is not now administering a Museum, it is carrying on the tradition established by its early members.

The financial statement submitted by Mr. W. B. Burrowes, Hon. Treasurer, was deemed satisfactory, appears on pages 58 and 59.

The reports were adopted on the motion of the President, Mr. R. S. Lepper, seconded by Mr. Joseph Skillen, who made a plea for the representation on the Council of the Archæological Section, which was now doing such important work. He was supported by Mr. Oliver Davies.

Mr. Lepper in his review of the year past characterised it as an active, progressive and very satisfactory one. The Society had naturally its limitations, but he thought they had got over the very big task they undertook some nine years ago when they spent well over £1,000 on their building. "I think the Society is in a very sound condition and we have right good men on whom to draw for our successors," he concluded. Mr. Lepper stated that the Council might consider the suggestion made by Mr. Skillen regarding representation of the Archæological Section on the Council of the parent body.

The reports were adopted.

On the motion of Captain Turner, M.C., seconded by Mr. J. W. Gilmour, Dr. S. W. Allworthy, Messrs. W. M. Crawford, A. Deane and Godfrey Ferguson were re-elected to the Council for a further period of three years, and Mr. A. Albert Campbell elected in room of Mr. R. A. Mitchell (retired).

Tributes were paid to the outgoing President by Mr. E. J. Elliott and Professor W. B. Morton, M.A., D.Sc., at whose instance the meeting placed on record their thanks for the services rendered by Mr. Lepper during his presidency of the Society for the second time.

At a subsequent meeting of the Council on the motion of the outgoing President (Mr. R. S. Lepper), Professor T. Thomson Flynn, D.Sc., M.R.I.A., was unanimously elected President.

ANNUAL MEETING

OF

ARCHAEOLOGICAL SECTION.

The Annual Meeting of the Section was held on Thursday, 4th November, 1937, Mr. O. Davies presiding.

Members Present.

Miss M. Gaffikin, Colonel R. G. Berry, Messrs. A. A. Campbell, F. J. Cole, A. H. Davison, A. Deane, E. E. Evans, J. T. Greeves, J. Skillen and S. D. Thompson.

Annual Report.

The following Annual Report, as approved by the Committee, was presented by the Chairman, and adopted on the proposal of Colonel Berry, seconded by Mr. A. H. Davison.

Excavations.

The Section during the past year has carried out a larger number of excavations than ever before. The season has been one of great archaeological activity in Northern Ireland, and the Section has borne its part well, and has been able to contribute to the exploration of five monuments of diverse periods.

Two or three years ago the Committee decided to entrust Mr. Davies with the restoration of the east window of Corick Abbey (Tyrone), of which it was believed that many stones were lying about in the graveyard. After some delays in fulfilling formalities of various sorts Mr. Davies was able to start work this spring. Two week-ends in February enabled him to explore the church, to collect all the carved stones in the grave-yard, and to prepare an article for publication; in the early summer a mason was set to work to repoint the east wall and to reset such stones as could be found. It was not possible, however, to complete the window, but it looks very much better than it did. The church is a XV century building, and traces of three or four windows were found, also parts of the round-headed door. A detailed study of the architecture of this period will be valuable; and the spot is well-known as one of the most beautiful places in Tyrone.

In May Mr. I. J. Herring, assisted by Mrs. Herring, Mr. McDonald, several other friends, and some of the " Inst." boy scouts, excavated a horned cairn on the land of Mr. James Farlow, in Ballyutoag, McIlwhan's Hill, about two miles from Ligoniel. The whole space between the horns was excavated. The facade consisted of 11 stones, of which two formed a portal with a low sill between; the axis through the sill probably touched a pointed stone near the end of the east horn, an example of askew building already observed on a number of horned cairns. The chambers had been completely destroyed for cultivation. In the

forecourt were found important remains of pottery. Above a packed sealing layer were late iron-age sherds with curvilinear decoration; below it about a dozen neolithic pots were represented, some shouldered bowls, also pots of Beacharra type and of Piggott's shape C.

In July Mr. Herring, assisted by Mrs. Herring, Mr. May, and other friends, with one labourer excavated a megalithic monument at Kilhoyle (Co. Derry). The monument had three chambers, being closed in front completely by a septal stone; the height of the chambers decreased towards the rear. Round the monument was a double peristalith. All the chambers had been disturbed, but remains probably of twelve pots were found, apparently all of the bronze age, also barbed and tanged arrowheads and flint scrapers.

In August Mr. Davies, assisted by Mr. Paterson, Miss Gaffikin and other friends, and with the help of three labourers, excavated the large cairn at Clontygora. This was one of the finest horned cairns in Ulster, and is under the guardianship of the Armagh County Council. Unfortunately, part of the second and the whole of the third chambers had been destroyed about a hundred years ago, and it was extremely difficult to determine the limits of the cairn; though the back area yielded many finds, they were unstratified, and fragments of neolithic and bronze-age pottery were mixed indiscriminately. The front chamber was however stratified, with neolithic, early bronze-age and iron-age sherds, also a number of flints. In the forecourt there was very little.

In September Mr. Davies, with assistance both from the Section and from the Belfast Museum, excavated the castle of Island MacHugh (Baronscourt). This has been in some ways one of the most valuable excavations carried out in Ulster in recent years, as though the site was not continuously occupied, it has yielded a long series of superposed layers, such as one rarely finds on habitation sites in this country. It has also given us a most valuable collection of medieval pottery, and for that period will probably remain a type-site for years to come. The castle itself belongs to the XVI century, and was perhaps reoccupied in the XVII; below it there are evidences of habitation as far back as the neolithic period. The excavation will be continued next year.

Members of the Section must, however, realise that this activity cannot be maintained unless they all support. Some members are perhaps remiss with their subscriptions; despite valuable papers and distinguished lecturers the attendances have been disappointing. Not as many as could be wished visit the excavations carried out by the Section; next year, if sufficient numbers apply, an attempt will be made to organise an excursion, and dates of excavations will be notified. Members should try to realise that the Section does not purport to consist of an aristocracy of experts who dislike interference; the more that everyone can co-operate the better.

PAPERS.

The following papers were given during the last season: " The Ancient Roads of Down and Antrim," by Rev. Leo McKeown, C.C.; " Excavations at Dun Ruadh, Ballyrenan and Carrick East," by Mr. O. Davies; " Excavations at Ballyedmond," by Mr. E. E. Evans; " Excavations at Largantea," by Mr. I. J. Herring; " The Irish Sea in Relation to Bronze Age Culture," by Miss L. Chitty.

The following papers have been arranged for the coming season: " Ireland in the Prehistoric Period," by Mr. O. Davies, on Tuesday, Nov. 30; Demonstration with short talks on recent finds and excavations, by the excavators, at the Municipal Museum, on Wednesday, Jan. 26, at 7 p.m.; Discussion, on some topic to be arranged, at which all members are invited to speak, on Tuesday, Feb. 22.

Statement of Accounts.

In the absence of the Hon. Treasurer of the Society the statement of accounts was not presented. The meeting agreed that the statement of the Hon. Treasurer be presented at the next Committee meeting.

Representation on the Council.

On the proposition of the Chairman, the question of the Section being directly represented on the Council by the Chairman and Hon. Secretary was discussed, and after a free exchange of views it was decided that representations be made to the parent body. If the Council so desired it was agreed that a deputation should be appointed from the section to discuss the matter.

Resignation of Chairman.

Mr. Davies, in tendering his resignation, outlined briefly the archaeological activities of the Section since he assumed office, and indicated as his view that it was not in the best interests of archæology that the office he was vacating should repose indefinitely in the one person. Mr. Cole, in proposing the thanks of the Section to Mr. Davies, referred to the great ability and enthusiasm which he had shewn since coming to Northern Ireland. Mr. Deane in seconding contrasted the position of archæology in Northern Ireland to-day with what it was before Mr. Davies' advent, as illustrating the contribution he had made. The meeting having endorsed the sentiments expressed, Mr. Davies replied.

Election of Officers.

On the proposal of Mr. A. A. Campbell, seconded by Mr. J. Skillen, Colonel R. G. Berry was unanimously elected Chairman. Mr. S. D. Thompson was elected Secretary on the proposal of Mr. A. A. Campbell, seconded by Mr. A. H. Davison.

Election of Committee.

As a result of a ballot the following five members were elected on the Committee for the ensuing year:—Miss Gaffikin, Messrs. A. A. Campbell, F. J. Cole, E. E. Evans and J. Skillen. Messrs. R. S. Lepper and Mr. A. H. Davison having tied for the sixth vacancy the latter withdrew his candidature, leaving Mr. Lepper elected. This concluded the business.

COMMITTEE MEETING.

Following the annual meeting of the Section the Committee met, and on the proposal of Mr. Skillen, seconded by Mr. Evans, Messrs. D. A. Chart, A. H. Davison and J. T. Greeves were unanimously co-opted on the Committee, constituting the new Committee as follows:—

Professor T. Thomson Flynn, D.Sc., M.R.I.A., The President of the B.N.H. & P.S.

A. Deane, F.R.S.E., The Hon. Secretary of the B.N.H. & P.S.

W. B. Burrowes, F.R.S.A.I., The Hon. Treasurer of the B.N.H. & P.S.

O. Davies, M.A., Lecturer in Archæology, Queen's University.

Col. R. G. Berry, M.R.I.A., J.P., Chairman of the Archæological Section.

S. D. Thompson, Hon. Secretary of the Archæological Section.

Miss Gaffikin, Messrs. A. A. Campbell, D. A. Chart, F. J. Cole, A. H. Davison, E. E. Evans, J. T. Greeves, R. S. Lepper and J. Skillen.

THE ACCOUNT OF THE BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY FOR THE YEAR ENDED 31st OCTOBER, 1937.

RECEIPTS.

To Subscriptions			£69 12 0
,, Dividends			13 12 3
,, Rents			200 8 8
,, Miscellaneous Receipts :—			
Archaeology	£21 0 0		
Nendrum and Collections ...	2 13 2		
Sundries	1 10 3		
		25 3 5	
,, Balance against Account on 31st October, 1937			119 2 3
			£427 18 7

PAYMENTS.

By Balance as per last Account			£99 10 2
,, Rent, Rates and Taxes			20 4 10
,, Insurance			6 15 0
,, Salaries and Wages			50 13 4
,, Fuel and Light			39 13 4
,, Other Payments :—			
Printing and Stationery Accounts	£74 10 3		
Advertising	16 2 10		
Archaeology	45 14 1		
Lectures and Lanterns ...	51 0 0		
		187 7 2	
Sundry Expenses	£2 2 11		
Bank Interest, Charges and Cheque Book	7 9 10		
Audit Fee	1 1 0		
Subscriptions	1 1 0		
Postages	12 0 0		
		23 14 9	
			£427 18 7

Securities—£400 York Street Flax Spinning Co., Ltd., 4½% Debentures.

We certify that the above is a true Account.

E. J. ELLIOTT, Governor.

W. B. BURROWES, Accounting Officer.

16th day of November, 1937.

I certify that the foregoing Account is correct.

C. H. MACONKEY, Comptroller and Auditor-General.

24th day of November, 1937.

The Account of The Belfast Natural History and Philosophical Society given on preceding page is in the form prescribed by the Local Government Board. It includes the subscriptions and expenses of the Archaeological Section, separate account for which is as follows :—

ARCHAEOLOGICAL SECTION.

1936.								1936.			
Nov. 1	To Balance	...	...	...	...	£117	1 1	Nov. 10	By E. E. Evans' Account	...	... £0 9 6
1937.								,, 25	,, Do.	...	... 5 5 0
Oct. 1	,, Subscriptions	...	...	...	...	16	0 0	1937.			
	,, Subsidy	...	...	...	...	10	0 0	Feb. 11	,, Northern Whig, Ltd.	...	... 5 12 6
								March 1	,, O. Davies	...	... 3 2 0
								,, ,,	,, I. J. Herring	...	... 0 16 7
								,, 26	,, Miss Chitty	...	... 2 18 0
								May 13	,, I. J. Herring	...	... 1 6 11
								June 22	,, Northern Whig, Ltd.	...	... 1 8 6
								,, 25	,, Do.	...	... 0 11 3
								,, 28	,, News-Letter (Miss Chitty's Lecture)		... 0 9 0
								,, ,,	,, O. Davies (Carrick Abbey)	...	... 5 3 7
								,, ,,	,, Congress of Archaeological Society		... 1 12 0
								,, ,,	,, I. J. Herring	...	... 0 16 9
								,, ,,	,, D. Ireland	...	... 1 0 0
								Aug. 23	,, O. Davies	...	... 11 5 2
								Oct. 13	,, I. J. Herring (Kilhoyle)	...	... 4 9 6
								,, ,,	,, Do. (M'Ilwaine's Hill)		... 0 2 10
								,, ,,	,, Balance	...	... ... 96 12 0
						£143	1 1				£143 1 1

W. B. BURROWES.

EXCHANGES.

*Publications received during year.

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*Abo—Publications of the Abo Academy.
*Albany—Bulletins of the New York State Museum.
*Ann Arbor—Publications of the University of Michigan.
*Athens—Publications of the Zoological Institute and Museum.
Auckland—Reports of the Auckland Institute and Museum.

*Basel—Verhandlungen der Naturforchenden Gesellschaft in Basel.
*Bergen—Publications of the Bergen Museum.
*Berkeley, Cal.—Publications of the University of California.
*Berlin—Publications of the Zoological Museum of Berlin University.
*Birmingham—Publications of the Birmingham Natural History and Philosophical Society.
*Bloemfontein—Publications of the National Museum of South Africa.
Boston—Publications of the Boston Society of Natural History.
*Boulder—Publications of the University of Colorado.
*Brisbane—Memoirs of the Queensland Museum.
Brussels—Annals Societe Royale Zoologique de Belgique.
* ,, Bulletin Societe Royale de Botanique de Belgique.
*Buenos Aires—Anales del Museo Argentino de Ciencias Naturales.
Buffalo—Bulletins of the Buffalo Society of Natural Sciences.

*Calcutta—Publications of the Geological Survey of India.
*Cambridge, Mass.—Publications of the Museum of Comparative Zoology.
*Cardiff—Transactions of the Cardiff Natuarlists' Society.
*Chicago—Publications of the Chicago Academy of Sciences.
Cincinnati—Bulletin of the Lloyd Library.
*Coimbra—Publications of the Zoological Museum of the University of Coimbra.
Colorado Springs—Publications of the Colorado College.
*Columbus—Ohio Journal of Science.
* ,, Bulletin of the Ohio Biological Survey.
*Coventry—Proceedings of the Coventry Natural History and Scientific Society.

*Danzig—Schriften Naturforschenden Gesellschaft.
*Dublin—Proceedings of the Royal Dublin Society.

*Eastbourne—Transactions and Journal of the Eastbourne Natural History, Photographic and Literary Society.
Edinburgh—Proceedings of the Royal Physical Society.
* ,, Proceedings of the Royal Society of Edinburgh.
* ,, Transactions and Proceedings of the Botanical Society of Edinburgh.
* ,, Proceedings of the Society of Antiquaries of Scotland.
*Exeter—Proceedings of the Devon Archæological Exploration Society.

*Glasgow—Transactions of the Geological Society of Glasgow.
*Gorlitz—Publications of the Natural History Society of Gorlitz.
*Goteborgs—Handlungar Regia Societas Scientiarum et Literarum Gotoburgensis.

*Halifax, N.S.—Proceedings of the Nova Scotian Institute of Science.
*Hove—Annual Report of the Brighton and Hove Natural History and Philosophical Society, 1937.

*Indianapolis—Proceedings of the Indiana Academy of Science.
*Ithaca—Bulletins of the Cornell University Agricultural Experiment Station.

La Plata—"Manuferos Fossiles de la Republica Argentina."
*Lausanne—Memoirs and Bulletins de la Societe Vaudoise des Sciences Naturelles.
*Lawrence—Bulletins of the University of Kansas.
*Lima—Memorias Sociedad de Ingenieros del Peru.
*Ljubljana, Yugoslavia—Transactions of the Natural Science Society.
*London—Publications of the British Museum (N.H.).
* ,, Quarterly Journal of the Royal Microscopical Society.
* ,, Publications of the British Association.
* ,, Proceedings of the Royal Institute of Great Britain.
* ,, Quarterly Journal of the Geological Society.
,, Publications of the Viking Society for Northern Research.
,, Reports of the National Trust.
*Los Angeles—Publications of the University of California in Los Angeles.
*Lund—Proceedings of the Royal Physiographic Society at Lund.

*Madison—Transactions of the Wisconsin Academy of Sciences, Arts and Letters.
*Madras—Publications of the Government Museum, Madras.
,, Report of the Madras Fisheries Department.
*Manchester—Journal of the Manchester Geographical Society.
*Melbourne—Proceedings of the Royal Society of Victoria.
*Montevidea—Archivos Sociedad de Biologia de Montevidea.
*Moscow—Bulletin de la Societe des Naturalistes de Moscow.

*Newcastle-upon-Tyne—Proceedings of the University of Durham Philosophical Society.
New Haven—Transactions of the Connecticut Academy of Arts and Sciences.
*New York—Annals of the New York Academy of Sciences.

*Oslo—Publications of the University Library, Oslo.
*Ottawa—Publications of the Geological Survey of Canada, Department of Mines.
* ,, Publications of the Canadian Department of Agriculture.
*Oxford—Proceedings and Report of the Ashmolean Natural History Society.

Padova—Atti dell Accedemia Scientifica.
*Philadelphia—Proceedings of the Academy of Natural Sciences of Philadelphia.
* ,, Proceedings of the American Philosophical Society.
*Polska—Annales Panstwowe Museum Zoologiczne.
*Pullman—Research Studies of the State College of Washington.

*Rennes—Bulletin Geologique et Mineralogique de Bretagne.
*Riga—Publications of the Latvijas Universitates, Riga.
* ,, Professor Strand, F.L.S.—Folia Zoologica et Hydrobiologica.
*Rio de Janeiro—Archivos do Instituto de Biologia Vegetal.
,, Archivos Botanico do Rio de Janeiro.
,, Publications of the National Museums of Brazil.
* ,, Publications of the Oswaldo Cruz Institute.
*Rochester, N.Y.—Proceedings of the Rochester Academy of Science.

*San Diego—Transactions of the San Diego Society of Natural History.
San Francisco—Proceedings of the California Academy of Sciences.
*Stillwater—Bulletins of the Oklahoma Agricultural and Mechanical College.
*Stirling—Transactions of the Stirling Natural History and Archæological Society.
St. Leonards-on-Sea—Report of the Hastings and St. Leonards Natural History Society.
,, Hastings and East Essex Naturalist.
*St. Louis—Annual Report of the St. Louis Public Library.
*Stratford—The Essex Naturalist.
*Stravanger—Publications of the Stravanger Museum.
*Sydney—Annual Report of the Technological Museum, Sydney.

*Toronto—Transactions and Proceedings of the Royal Canadian Institute.
*Torquay—Transactions and Proceedings of the Torquay Natural History Society.

*Upsala—Bulletin of the Geological Institution of the University of Upsala.

*Vienna—Verhandlungen Zoologisch-Botanischen Gesellschaft.

*Washington—Annual Report of the Smithsonian Institution.
* ,, Proceedings of the United States National Museum.
* ,, Smithsonian Institution, Miscellaneous Collections.
* ,, Publications of the United States Geological Survey.
* ,, Publications of the United States Department of Agriculture.
* ,, Bulletin of the Bureau of American Ethnology.
*Welshpool—Publications of the Powys-land Club.

*York—Annual Report of the Yorkshire Philosophical Society, 1937.

*Zurich—Publications of the Natural History Society of Zurich.

BELFAST NATURAL HISTORY AND PHILOSOPHICAL SOCIETY.

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[**Denotes Holders of three or more Shares.*]
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---

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Grainger, Robert, The Beeches, Holywood
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*a*Greeves, John Theo., Nendrum, Knockdene Park, do.

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*a*Hamilton, Wm. Hume, Hillside, Donegall Park, do.
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*Herdman, Sir Ernest, D.L., J.P., 1 May Street Belfast
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*a*Herring, Ivor J., M.A., 42 The Uplands, Loughton, Essex
*a*Hogg, A. R., 67 Great Victoria Street, Belfast
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*a*Kerr, A. W. M., M.A., LL.D., 23 Hughenden Avenue, Belfast
*a*Kerr, The Very Rev. W. S., B.D., Dean of Belfast, 41 Wellington Park, do.
*Kinghan, John R. (Representatives of), Windsor Avenue, do.

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*a*Lowry-Corry, Lady Dorothy, Castle Coole, do.
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*Macrory, A. J. (Representative of), do.
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Malcolmson, Herbert T., M.B.O.U., 32 Arthur Street, Belfast
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*a*Maxwell, W. C. A.R.I.B.A., 3 Wellington Place, do.
Mayes, Capt. T. H. F.C.A., 2 Spokane Villas, Knock Road, do.
*a*Megaw, Basil R. S., B.A., Manx Museum, Douglas, I.O.M.
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